Assessing the Feasibility of Transmission of Risk Management Instruments to Natural Rubber Smallholders in Thailand

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Final Report
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This report was prepared by the Economic and Social Institute, Free University, Amsterdam, and the International Rubber Study Group, London, for the International Task Force on Commodity Risk Management. This report is based on mission work in Thailand in 2001. The team included Christopher Gilbert, Prachaya Jumpasut, Hidde Smit, Jacob Yaron and Wouter Zant. Any correspondence should be addressed in the first instance to:

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Abbreviations

ADS	Air-Dried Sheet
AMC	Asset Management Company
BAAC	Bank for Agriculture and Agricultural Cooperatives
BoT	Bank of Thailand
CRM	Central Rubber Market
DoA	Department of Agriculture
DoAE	Department of Agricultural Extension
drc	dry rubber content
ESI	Economic and Social Institute (Free University, Amsterdam)
GoT	Government of Thailand
INRO	International Natural Rubber Organization
IRSG	International Rubber Study Group
ITF	International Task Force on Commodity Risk Management in Developing Countries
KTB	Krung Thai Bank
LME	London Metal Exchange
LTM	Local Transmission Mechanism
NR	natural rubber
OAE	Office of Agricultural Economics
OME	Osaka Mercantile Exchange
ORRAF	Office of the Rubber Replanting Aid Fund
OTC	Over the Counter
REO	Rubber Estate Organization
RRIT	Rubber Research Institute of Thailand
RSS	Ribbed Smoked Sheet
SICOM	Singapore Commodity Futures Market
SR	synthetic rubber
STR	Standard Thai Rubber
TOCOM	Tokyo Commodity Futures Market
TSR	Technically Specified Rubber
USS	Unsmoked Sheet

Chapter 1 Introduction and Summary

1.1 Composition

This is the report of a "test case" of a commodity risk management scheme undertaken under the auspices of the International Task Force on Commodity Risk Management (the ITF). The report relates to the intermediation of risk management to natural rubber smallholders in Thailand. It is directed to the ITF and to the World Bank, which commissioned the report on behalf of the ITF. The mission on which this report was based was undertaken by members of the Economic and Social Institute (ESI) of the Free University, Amsterdam (the Netherlands),[1] the International Rubber Study Group (IRSG), the rubber commodity body, which is based in London (UK)[2] and the World Bank.[3] The report has been written by the ESI and IRSG members of the group.

1.2 Objectives

The objective of this project is to examine the feasibility of intermediation of risk management instruments to smallholder natural rubber farmers. We propose to undertake a detailed study of the feasibility of this approach in relation to the natural rubber industry in Thailand. We propose to consider

a) the extent of farmers' current exposure to rubber price volatility, its importance and the means they currently have for protecting themselves against this volatility;
b) potential availability of risk management instruments suitable for intermediation to these farmers; and
c) the availability of suitable intermediation agencies.

The project proposal, which also served as the mission's terms of reference, are attached as Appendix A.

1.3 Outline of the Proposal

Our detailed proposal is set out in Chapter 6 of the report, and some readers may wish to turn directly to this location. In outline, the transaction we propose has the following structure:

a) A retail bank, the state-owned Bank for Agriculture and Agricultural Cooperatives (BAAC) will intermediate price insurance to farmers either as a component of its regular lending program to farmers, or through cooperatives. In both cases, the price insurance should give BAAC greater security with regard to recovery, and may enable them to charge a lower interest spread on insured loans. In the latter case, cooperatives would buy the insurance from BAAC either by paying in advance out of

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retained profits or on credit. The cooperatives would make this insurance available to their farmer members as a membership benefit. Both methods of intermediation would result in very low incremental administrative costs.

b) In the event of a price beneath the insured level, farmers and cooperatives would be insured only on the quantities of rubber that they had actually insured. The actual quantities of rubber produced and/or sold would be irrelevant. There will therefore be no need for BAAC to monitor farmers' production or sales levels, and farmers have no incentive to suggest incorrect production figures. For the same reason, farmers will receive the market price and not the insured price for any (incremental) quantities exceeding the quantity insured. The price insurance scheme will not give rise to any incentive to alter production levels from those which would prevail in its absence.

c) Thailand has a system of well-organized Central Rubber Markets (CRMs) for unprocessed rubber. Farmers receive prices which correlate closely with the price at the nearest CRM. Price insurance will relate to monthly averages of CRM prices. The actual price at which an insured farmer sold is therefore irrelevant to the scheme, and BAAC has no need to monitor sales prices. For the same reason, farmers have no incentive to make incorrect price claims.

d) BAAC appears to us to be the natural retail intermediary in Thailand because of its high outreach to the smallholder community (80% coverage is claimed), because of its close relationship with agricultural cooperatives, because of its low cost levels and because historically it has enjoyed a good loan recovery rate. In a variant of the scheme, we envisage price insurance being intermediated through the current Thai rubber intervention scheme, through the Rubber Estate Organization (REO) which is responsible for administering this program.

e) BAAC will purchase OTC rubber put options from a wholesale bank, probably at monthly intervals. BAAC's options will be written on a Bangkok dollar price. The wholesale bank may also offer insurance on Baht-dollar exchange rate, or BAAC may prefer to hedge out its foreign exchange risk independently. BAAC will also need to cover basis risk arising out of variations in the cost of processing rubber from unsmoked to smoked sheet. We believe that this component of basis risk is relatively small. However, BAAC will need to quantify and make provisions against any exchange risk and basis risk to which it is exposed.

f) The wholesale intermediary will offset its risk position either by selling futures on one of the two existing rubber futures exchanges (SICOM and TOCOM) or on the proposed Bangkok futures exchange, or alternatively by swapping out the risk through rubber consuming companies (effectively, one of the major tire manufacturers). We do not make any specific proposal with regard to the identity of the wholesale intermediary, although we note that two major international banks have expressed strong interest in continuing discussions. It seems likely that other banks would also be interested.

The transaction structure appears well mapped out at the retail level, and we regard this as relatively unproblematic. The proposed retail intermediary, BAAC, is committed

to the scheme, and those cooperatives to which we have talked also expressed strong interest. Of course, in the end, take-up will depend on the premium levels we are able to offer. We believe that premium levels of between 2% and 8% would be feasible for short term slightly out-of-the-money put insurance.

1.4 Difficulties and Unresolved Problems

It would be misleading to give the impression that the proposed scheme is without major problems. In our view, the retail side of the scheme is relatively unproblematic, largely because of the suitability, financial strength and reliability of BAAC. However, problems exist at the wholesale stage, and there are also important political questions which require resolution.

At the wholesale level we note the following:

a) If the wholesale intermediary is to offset its risk position by selling rubber futures, it currently must do so either on SICOM or TOCOM[4]. Despite the very positive moves taken by the GoT in 1999 and 2000 to create a Bangkok agricultural futures exchange, we do not believe it is realistic to suppose that there will be liquid trading in rubber contracts on the proposed futures exchange in the near future, although we hope that we may be proved wrong in this judgment. Of the two existing exchanges, SICOM currently has low liquidity, although it may provide a potentially good hedging basis for Thai rubber, while TOCOM, which trades in yen, is said to be highly speculative and offers a poor hedging basis because of high (location and currency) basis risk. It is possible that, if this scheme becomes operational, it will generate increased liquidity on SICOM, which will in turn cheapen the insurance premium required. We also suggest practical steps, which SICOM can take to improve its hedging basis for Thai rubber.

b) The alternative possibility is for the wholesale intermediary to swap out its risk position with a rubber consuming company, almost certainly a tire manufacturer. Here, the difficulty is that the tire company has to see an incentive to act as counter-party. It has been suggested to us that tire companies might find collar structures, in which they exchange a price floor in favor of farmers for a price ceiling in their own favor, more attractive than sale of puts for premium income. However, in our view, collars are relatively unattractive to farmers, who stand to lose at least part of the benefit of high prices, and to the retail intermediary, which, in the absence of collateral, will face potential performance problems. There is therefore a potential mismatch between the retail products we wish to market and the most readily

[4] Rubber futures denominated in Japanese yen are also traded on the Osaka Mercantile Exchange. This exchange, however, is small relative to TOCOM, and is likely to have a comparable price development, as TOCOM although there are some signs that OME is less speculative. Nevertheless, because of size we focus on TOCOM as far as Japanese exchanges are concerned.

available wholesale products. This was a problem we had not anticipated at the start of the study.

c) Floor price insurance at levels, which will be interesting to farmers, is likely to prove very expensive in weak market conditions, such as those currently prevailing. In our view, the proposed scheme will only be viable without some form of subsidy when market conditions are at least moderately buoyant. This has implications for the timing of any pilot scheme, but it also has implications for the Thai government if it wishes to look at this scheme as a way of helping farmers at times of low (as distinct from falling) prices.

As noted, there are also problems at the political level:

a) Thailand currently operates a rubber intervention scheme with the objective of supporting the price received by smallholders. Our analysis suggests that the scheme does attain its objectives but at a very high cost, partly borne by the government and partly by the exporters and the domestic processing industry. The scheme also stimulates production and may be partially responsible for low world rubber market prices. The insurance scheme we propose is unlikely to be effective if the current intervention scheme remains active. Instead we propose that the price insurance scheme should replace the intervention scheme. There appears to be wide support in the Thai rubber industry for this proposition. The new Thai government has recently (June 2001) extended the price intervention for a period of another year.

b) Price insurance schemes, such as the one proposed, can efficiently insure farmers against falls in prices but cannot easily insure against low prices *per se*. This is because insurance against a continuation of a low price once the price has already fallen will almost certainly be prohibitively expensive. It will therefore be important that the Thai government form a view as to whether it is interested in insurance or price support. Price support will inevitably require a subsidy, although we also believe that subsidization of insurance premium levels is an efficient means of providing support. By contrast, we do not see any continuing need for support in a pure insurance scheme, although it would be useful to obtain some assistance in the initial years of such a program.

c) During the campaign preceding the recent Thai election, parties made extravagant promises, including one for a moratorium on repayment of agricultural loans. Unless well-managed, the result of policies giving effect to these promises and the expectations created by the promised themselves may undermine the loan payment culture in Thailand, and seriously threaten the asset position of Thai banks, including that of our intended retail partner, BAAC. Recent evidence indicates that BAAC's loan recovery rate indeed has deteriorated significantly but not substantially over 2001 and that this deterioration is attributed to the debt moratorium. Favorable resolution of these uncertainties is a precondition for proceeding with the full rubber price insurance scheme.

d) Thailand currently imposes exchange control restrictions that are onerous on domestic residents and a severe nuisance for actual and intending foreign investors.

This results in a relatively wide spread on forward Baht transactions, and makes it impossible for Thai resident persons and difficult for Thai companies to buy and sell instruments on international markets. Our view is that it will only be possible to implement the rubber price insurance scheme with reasonable premium levels if there is a relaxation of these restrictions, in particular in relation to trading on forward and futures markets (whether Thai or overseas). This relaxation might take the form of replacing the current system in which one needs to apply for foreign exchange on a transaction by transaction basis, to a system in which one applies for a facility valid for any number of transactions up to a specified net value and over a specified time. Unfortunately, we did not receive any indication that the Bank of Thailand would look favorably on any such relaxation.

The strength of this proposal lies in the anticipated reliability of the local transmission mechanism, while the major difficulties arise at the wholesale and political levels. We believe that, given the will to do so, these problems are surmountable.

Chapter 2 Background

2.1 Macro-economic performance, poverty and agriculture in Thailand

With a population of 61.7 million, and a GNP per capita of US$1,960, the Thai economy ranks the fifth in size amongst the East Asian economies, after Japan, China, Korea, and Indonesia. Thailand, a traditional agrarian nation occupying a land area of 510.9 sq. kilometers, has today a complex and multi-faceted economy, with a strong industrial sector using the latest technology. In 1979, agriculture employed more than two-thirds of the labor force and contributed more than 25% to GDP, compared to manufacturing's 20 percent. Agriculture now accounts for less than 12% of GDP (but more than 1 million workers in rubber production alone), while manufacturing's share has soared to nearly 30%. The transformation from an agrarian to an industrial-based economy has been achieved by following a development strategy of outward orientation, receptivity to foreign investment, and sound macroeconomic and fiscal management.

Thailand has enjoyed three decades of impressive economic development, with real per capita income averaging 5% each year. GDP growth was well-balanced, driven by both capital accumulation and improvements in labor productivity. The contribution of total factor productivity growth to annual GDP growth jumped from 0.6% in 1981–85 to 3.2% in 1986–90. This increasing efficiency in resource use enabled Thailand to capture new markets and sustain its remarkable export performance.

But the record was not unblemished, and vulnerabilities accumulated rapidly in 1991–96. Rapid growth was accompanied by rising income inequality and environmental degradation. Capital was flowing swiftly into the country, attracted by past economic success, a lifting of capital controls, and a macroeconomic framework that encouraged short-term external borrowing. Soon capital had replaced exports as the primary engine of growth (investment as a share of GDP reached 41 percent). The rapid buildup of capacity, especially in commercial property and other non-tradable goods, turned the current account negative and put pressure on wages. Imprudent investment decisions by the private sector and the failure of public policy to bring about changes in economic behavior led to a crisis of confidence in 1997 and deep recession, with disastrous effects on the financial sector, in particular, and the economy in general (see financial sector issues below). To deal with the crisis and promote longer-term growth, Thailand embarked on a twin strategy of macroeconomic stabilization and deep structural reform. As a result, Thailand's economic recovery is on track, but remains fragile and uneven. Real GDP grew by 4.3% in 2000, with exports acting as the major driver. Despite growing imports, the current account generated a sizeable surplus of 7.5% of GDP, compensating for capital outflows. Real GDP is projected to grow at 3% in 2001, and by a modest rate of around 4–5%over the medium term.

On the social front, poverty has been reduced from over 57% in the late 1960s to less than 20 percent today. Thailand has enjoyed dramatic improvements in other social indicators, such as food security, education, infant mortality (30 per 1000 live births), and life expectancy (69 years). After many years of continuous improvement, progress in poverty reduction came to a sudden halt as the crisis began in 1997. Poverty, which had fallen from 30% of the population to 11% in just 8 years, rose again to 13%. The pain this has caused is substantial, particularly when contrasted with the positive expectations for the future that developed during the long period of growth.

The crisis revealed three areas to be especially important for the design of longer-term poverty programs. Most important, the crisis showed how many of the Thai people adjusted to the economic shock by migrating to rural areas, suggesting that government should aim to complement rather than displace these adjustments. The crisis also revealed that existing policies were inadequate to reduce risks in the market economy, particularly for the poor, and that government lacked timely information on the impact of economic conditions on people's well-being. Although the crisis did not change the overall picture of poverty (before and after the crisis the poor were disproportionately rural villagers, owning little or no land, and living in the Northeast, with little education and, to some extent, are households with elderly heads), it did change its composition. The long-term poor and the newly (crisis-induced) poor had different characteristics. The largest increases in poverty were in the South and Central regions. Thailand's relatively flexible labor market absorbed much of the impact of the crisis through lower wages, thus spreading a smaller effect across more people.

The social impact of the crisis has shown the need for policies that specifically incorporate safety needs for vulnerable groups - reliance on growth alone is not enough. Thailand's new Constitution also recognizes a more central role for communities in decision-making and calls for decentralization of environmental and natural resources functions to local governments. Sustainable growth also requires a transformation of public sector institutions and policymaking capacity to meet the challenges of a sophisticated modern economy.

Notwithstanding its relatively small size in the national economy, the agriculture sector continues to be of considerable importance as the majority of the labor force still works in the sector. Agriculture has been the largest recipient of national budget allocations, after education and national defense, since 1961. In broad terms, the sector includes crop cultivation, forestry, livestock breeding, and fisheries. Rice forms the staple part of the Thai diet, as well as the base of the rural economy. Other important crops that contribute to the rural economy include export crops such as sugar, tapioca, maize, pineapples, rubber, coconuts, and kenaf. Raw cotton and soybeans are also produced for export, and tobacco production is on the rise. Tropical fruits, including more than 20 varieties of edible bananas are grown in abundance, and the livestock sub-sector includes cattle, poultry, and swine rearing.

The Thai Government has provided moderately subsidized agricultural credit in the form of concessional loans or financing quotas for the agricultural sector through the following channels: (i) the BAAC; (ii) the commercial banks; and (iii) a paddy mortgage

scheme. These programs have together amounted to a total subsidy amounting to about 1 percent of the value added by the agricultural sector. The sector as a whole has also benefited from government investments in irrigation and rural roads. The past two decades also witnessed a progressive liberalization of export agriculture.

2.2 The financial sector in Thailand

In pre-crisis Thailand, the financial sector comprised the Bank of Thailand (BoT), 14 private banks, one state-owned bank, 14 branches of foreign banks, and 91 finance companies. In the aftermath of the crisis, the financial sector has been consolidated, resulting in a major reduction of finance companies to 20, and an increase of foreign bank branches to 20. This consolidation arose out of the perception of earlier excess liquidity in conjunction with poor corporate governance, inadequate reporting and insufficiently rigorous regulation. Despite IMF and World Bank-supported stabilization, concerns remain, including the slow progress in corporate debt and bank restructuring, high levels of non-performing loans, and the mixed evidence on recovery of demand.

In terms of the agricultural sector, commercial banks lend to large agricultural estates and to commodity processors and exporters. However, they have not invested in rural networks to the same extent as BAAC and do not find it profitable to compete for relatively low value smallholder business – see Section 5.3. Thai law requires that banks invest a certain proportion of their loan portfolios in the agricultural sector. In the past, many banks have exploited a provision that allows them to meet this requirement by depositing the required funds with BAAC. This provision allowed BAAC to build up its agricultural lending without significant competition with the consequence that more than 80% of farm households have BAAC accounts. Rapid development of the agribusiness sector has implied that the commercial banks can now meet their agricultural lending quotas through commercial lending to the sector, and their average loan size in the agricultural sector exceeds that of BAAC by a factor of eleven.

As in other Asian economies, doubtful lending by Thai banks was one of the causes of the 1997-98 crisis. The crisis left banks with large portfolios of non-performing assets. The situation in 2001 is substantially improved over that of two years ago. Debt has been marked-to-market and most private banks have made significant progress towards meeting regulatory capital adequacy standards. The 30% of banks that remain state-owned have also seen debt restructuring, although to a lesser extent. Some progress has been made in transferring non-performing loans of the state banks to Asset Management Companies (AMCs), thereby marking the debt to market. As a consequence of this and of the mild economic recovery, non-performing loans fell to 23% of total lending in September 2000, from 42% in November 1999. However, less progress has been made in establishing AMCs for the private banks, and the new government has proposed a state AMC that may accelerate this process.

Banking regulation has also improved. A new financial law was passed in 2000, and the BoT has strengthened its regulatory oversight facilities. BoT regulators are now better qualified and better trained than previously. However, it is too early to be confident that regulatory quality will improve in the same measure.

Despite these measures, the debt overhang remains severe, and is a major factor constraining Thai growth. It is also a significant factor in domestic politics. There are two lingering concerns. First, it is important that the planned national AMC aggressively manage outstanding debt – every Baht not repaid is a call on the Thai taxpayer. Repayment of debt releases these resources for productive investment. Secondly, during the recent (2001) election campaign some political candidates made promises that have been taken as sanctioning loan default. It is important that the Thai government now publicly reinforce loan repayment disciplines.

A large number of international banks operate in Bangkok, although in many cases the scale of operations is small. To some extent, international banks are involved in the domestic retail sector in competition with domestic commercial banks. This is particularly true with regard to credit cards. More typically, however, these banks confine their activities to the corporate sector, and to transactions with international aspects. The Bangkok branches of these banks usually report to regional head offices in Singapore, Hong Kong or Sydney.

Chapter 3 The Thai natural rubber industry

3.1 Demand and supply in natural rubber: worldwide and in Thailand

Worldwide demand and supply of natural rubber

World total rubber consumption (i.e. natural plus synthetic rubber) has increased steadily in the last two decades, even though the world economic recessions in the early 1980s and the early 1990s severely depressed the rubber market. Natural rubber is consumed largely in the tire sector.

Until 1940 natural rubber was the only source of rubber. Large-scale production of synthetic rubber emerged when, during the Second World War, supply of natural rubber was insufficient, largely due to blocked supply lines. In the 1950s and 1960s production of synthetic rubber increased dramatically because demand, particularly in the automotive sector, grew much faster than supply of natural rubber, thus creating a reduction in the share of natural rubber from 75% in 1950 to 30% in 1980. Owing to technological improvements, synthetic rubber was able to take over from natural rubber. However, the decline in the share of natural rubber was gradually stopped because certain end-uses, in particular radial tires for passenger cars and tires for trucks still need a substantial share of natural rubber, which cannot easily be replaced by a synthetic substitute. Price responsiveness decreased owing to an increasing emphasis on technology rather than price. During the early 1990s, the share of natural rubber increased further because of the contraction in total elastomer consumption in the former Soviet Union, which had a share of natural rubber in total consumption of less than 10%.

On average, about two thirds of all natural rubber is used for tires, especially for heavy truck tires. The remaining one third is used for general products, a large part of which is used in the automotive sector. Consumers (i.e. manufacturers) in the general products area are numerous. However, on the tire side mergers and acquisitions have led to strong concentration. There are three big tire companies - Bridgestone, Goodyear and Michelin - three medium sized tire companies - Continental, Pirelli and Yokohama. These six together take an overwhelming share of natural rubber consumption. All six, and some of the others, have purchasing offices in Singapore and local agents in natural rubber producing countries.

The major tire manufacturers make most of their purchases on a direct trade basis rather than through rubber markets. The increase in direct trading between rubber processors in the origin countries and tire manufacturers has implied that a smaller proportion of rubber than previously passes through open rubber markets. But although being a residual source of supply, these markets maintain the function of providing a market price for all major flows of natural rubber.

Competition with synthetic rubber as well as a number of specific developments in major rubber good categories, determined the development of consumption of natural rubber in the recent decades. In 1975 both the tire sector and the general rubber

goods sector (e.g. belts, hoses, gloves, automotive parts) each consumed about 1,500 thousand tonnes (Figure 3.1). However, in the general rubber goods sector many applications of natural rubber were lost to special purpose or specialty synthetic rubbers. On the other hand, the aids scare has helped natural rubber to keep consumption in the general goods sector at a steady level. Because of its technical qualities in tires natural rubber has done very well in the tire sector.

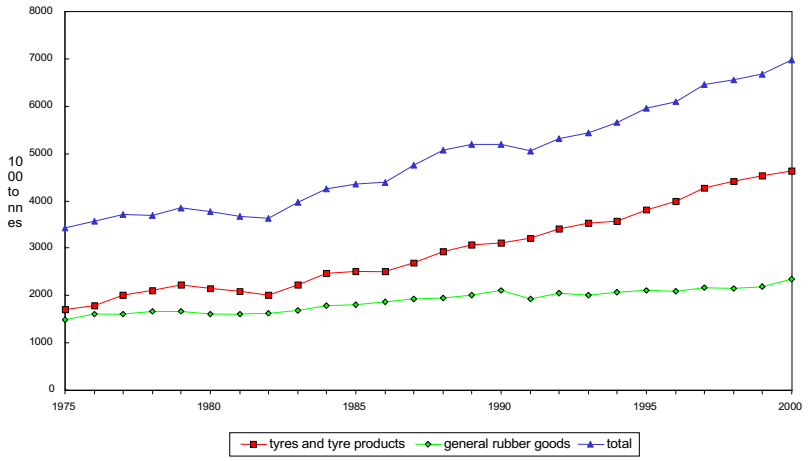


Figure 3.1 World consumption of natural rubber (source: own calculations)

Having mentioned that the tire sector is very important for natural rubber and vice versa, it is possible to look more in-depth at the tire sector, splitting tires into passenger car tires, truck tires and other tires (motor cycles, bicycles, airplane tires, off-the-road tires etc.). Because of technical aspects, natural rubber is strongly required for truck tires: about 75% of rubber in each tire is natural rubber. It is estimated that about half of all natural rubber is used for truck tires (see Table 3.1).

Table 3.1 World consumption of rubber by end-use

	total rubber		natural rubber		
	x 1000 tonnes	share in total in %	x 1000 tonnes	share in total in %	natural rubber content in %
passenger car tires	2230	13.2%	542	8.1%	24.0%
truck tires	4404	26.1%	3303	49.5%	75.0%
other tires	2059	12.2%	618	9.3%	30.0%
general rubber goods	8177	48.5%	2208	33.1%	27.0%
Total	16870	100.0%	6670	100.0%	40.0%

Source: own calculations

Thailand's position in the world rubber market

The distribution of production of natural rubber by country has changed dramatically during recent decades. Malaysia's production has declined strongly as a result of a shift

by farmers, and in particular their children, to other modes of employment that provide better pay or a more attractive working environment. Thailand, on the other hand, strongly increased production during this period, due to ongoing replanting schemes. Comparing the three major producers, Malaysia lost its role as leading producer in 1991 to Thailand, while Indonesia remained in second place. Among the Asian producers, also India, the Philippines and China showed strong growth. In both the Philippines and India, most (if not all) domestically produced natural rubber is also consumed in the domestic economy. After a turbulent period, Vietnam and to a lesser extent Cambodia have returned to producing natural rubber and, in terms of availability of area, there appears to be plenty of scope for expansion in these countries.

Thailand's rubber production has risen enormously in recent decades. From less than 200,000 tonnes in the 1960's, production has risen to over 2,200,000 in 2000 (preliminary data for 2000 indicate a level of production of over 2,500 thousand tonnes). In 1999 Thailand produced about 2,180 thousand metric tons, 34% of world production. The share of Thailand in world production also shows a steady increase over the past 25 years (Figure 3.2).

At the international level, the secular increase in direct trading between producers and consumers, together with increased computerization in manufacturing production, has resulted in a demand for higher quality specifications, and this has put pressure on producing countries to improve quality and consistency of their rubber exports. Thai rubber market policy is currently moving from an emphasis on increasing quantity to one of improving quality. In particular, there is a move from production of traditional ribbed smoke sheet (RSS) to the technical specified rubber (TSR).

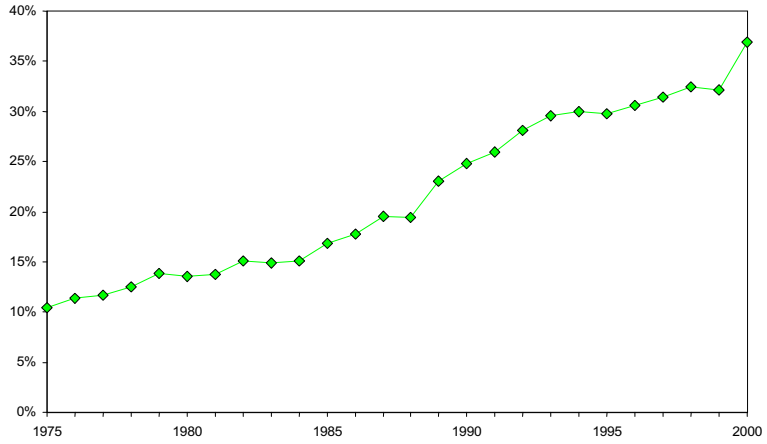


Figure 3.2 Share of Thailand in world natural rubber production (source: IRSG)

Destination and end-uses

Thai net exports in 1999 of natural rubber were 1,886,000 tons, 41% of world exports. Domestic consumption of natural rubber in Thailand is limited, resulting in an overwhelming share of production being exported. Consumption reached about 10% of production in 1999, very low compared to most natural rubber producing countries. Details are shown in Figure 3.3.

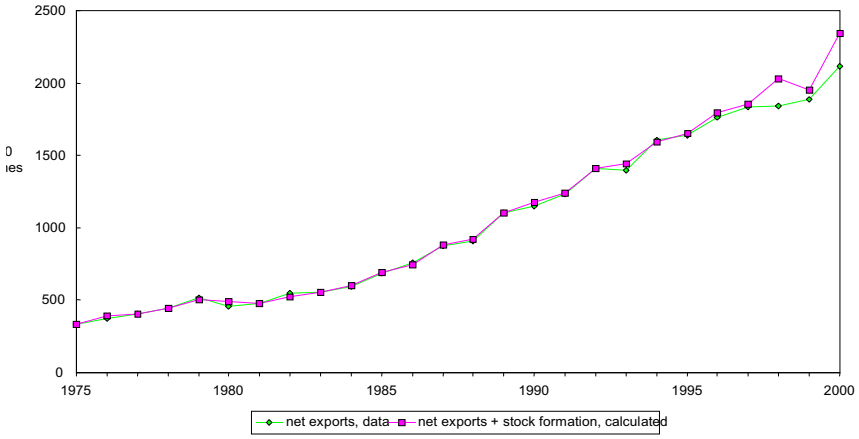


Figure 3.3 Net export of natural rubber of Thailand (source:IRSG)[5]

Natural rubber exports from Thailand by country of destination for 1990, 1995 and 2000 are shown in Table 3.2. The importance of Japan as the major importer has declined, even in absolute terms. The recession in Japan and the maturity of the Japanese rubber sector explain this development. In addition, Thailand has shifted to more production of Technically Specified Rubber, preferred in many other parts of the world. Exports to Singapore are largely for re-export to other countries. China moved to second place, while the share of the USA and Europe is rather steady. Export of unprocessed rubber to Malaysia also has increased substantially. Malaysia imports natural rubber from Thailand to feed its processing industry and re-exports it in processed forms. Actual exports are likely to substantially exceed the official data presented in Table 3.2.

Exporters in Thailand are predominantly local companies. There are about ten major companies, most of whom run factories and export rubber. In alphabetical order, the major traders are Southland, Sri Trang, Teck Bee Hang, Thai Hua and Von Bundit. Some cooperatives have also started exporting, albeit on a small scale.

[5] The accuracy of the data for 1998-2000 may have been affected somewhat by the available quality of estimated stock figures, including government intervention stocks (see Chapter 3).

Table 3.2 Exports of natural rubber from Thailand by destination

	1000 tonnes			share in %		
	1990	**1995**	**1999**	**1990**	**1995**	**1999**
Japan	440.0	561.8	509.7	38.2	34.4	27.0
USA	99.8	231.9	236.4	8.7	14.2	12.5
Europe	155.9	227.0	274.3	13.5	13.9	14.5
China	173.0	200.0	306.8	15.0	12.2	16.3
Korea	57.3	95.8	157.2	5.0	5.9	8.3
Singapore	144.1	49.5	77.4	12.5	3.0	4.1
Malaysia	21.3	108.4	154.9	1.9	6.6	8.2
Others	59.4	161.1	169.6	5.2	9.9	9.0
Total	**1150.8**	**1635.5**	**1886.3**	**100.0**	**100.0**	**100.0**

Source: IRSG

3.2 Geographical distribution of natural rubber production in Thailand

The enormous increase in production of natural rubber in Thailand in the recent decades has come from expansion of the total rubber area and from extensive replanting of old area by higher yielding clones. The increase in area has occurred throughout the Kingdom, but it is interesting that an increase has been realized in the northeast of the country. Traditionally areas have been located in the south, which was claimed to be more suitable for production. Out of an estimated total area under rubber of 12,245,533 rai (equivalent to 2,040,922 hectares) in 1996, 85.4% is located in the south, 12.3% in the southeast, and 2.3% in the northeast (see Table 3.3). The share of the northeast in production will be slightly lower, because trees are younger and, to a larger extent immature.

Table 3.3 Distribution of area under natural rubber by region

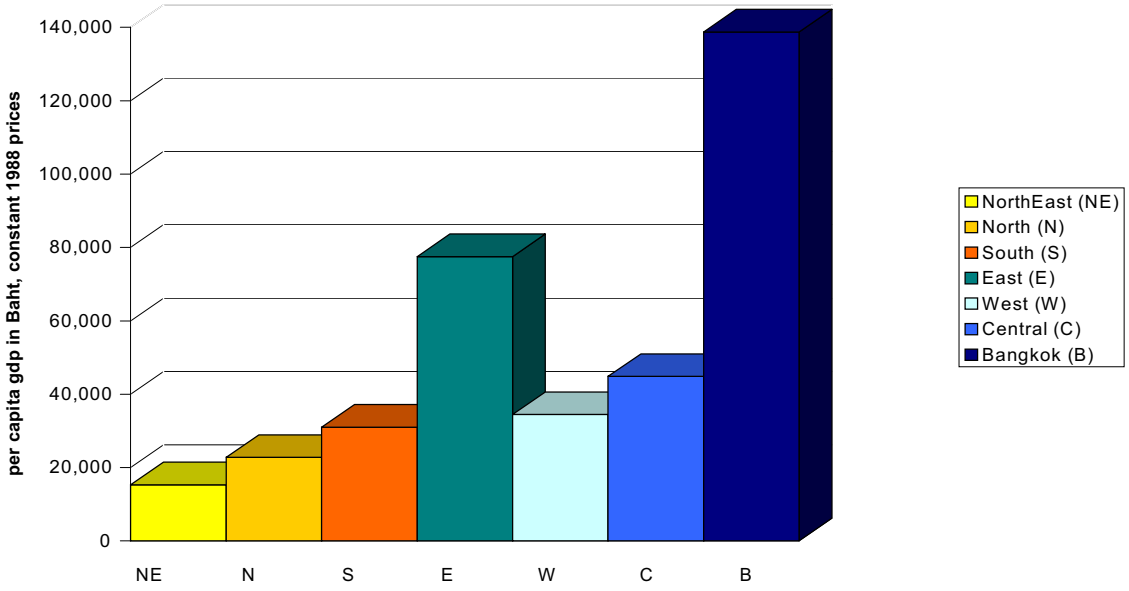
Region	**1986**		**1990**		**1996**	
	x 1000 rai	share in %	x 1000 rai	share in %	x 1000 rai	share in %
south provinces	9,686	90.0%	9,714	88.4%	10,454	85.4%
southeast provinces	1,080	10.0%	1,084	9.9%	1,507	12.3%
northeast provinces	-		194	1.8%	284	2.3%
TOTAL	10,766	100.0%	10,992	100.0%	12,246	100.0%

Source: Thailand Rubber Statistics, RRIT

The shift to increase area under rubber in the northeast needs further explanation, especially in view of the claimed suitability of the south for natural rubber growing. Deforestation of the northeast is said to be one of the reasons for considering the possibility of growing rubber in this area. But political and military considerations are likely to be major factors behind the move of government rubber support to the north-

east. The northeast is overall one of the poorest regions within Thailand, and lacking economic opportunities. This is supported by the level of per capita gross domestic product (see Figure 3.4 below). The effort of the Thai government to shift production away from the south and to the north, should be evaluated in the light of this regional imbalance. ORRAF staff confirms that planting and replanting subsidies for natural rubber are planned to shift from the south to the north.

Figure 3.4 Per capita gross domestic product by region, 1992-1998



Source: Economic and Social Development Board, Thailand

As far as poverty on household level is concerned, we note that a representative survey among Thai households is carried out every two years by the National Statistical Organisation. However, we have been unable (yet) to obtain information from this source on the relative position of rubber growers and rubber tappers. The size distribution also may give some impression on the level and distribution of poverty. Unfortunately no region-wise data on the size distribution are available (yet). Nevertheless, a large majority of rubber growers (93%) have a relatively small plot size of 2 hectares on average.

The southern area found Hat Yai has the greatest concentration of rubber smallholders (see also Table 2.4). And, although smallholders in the north-east are almost certainly poorer than those in the south, production is also more dispersed and cooperatives are weaker. Farmgate prices in the north-east would be less closely related to CRM prices. Also there is less experience in producing and processing natural

rubber and the infrastructure of the rubber market is less developed. Our view, and that of that of the Thai industry, is that the south is the natural place to start the scheme. Further directions on where to start a pilot scheme are obtained from the survey among cooperatives and the information on willingness to pay (see Section 5.1).

3.3 The micro economics of natural rubber production

Planting and tapping

Rubber trees (*Hevea brasiliensis)* only become productive after five to eight years. This so-called immaturity period depends on the kind of clone and on preparatory growing in nurseries. Maximum yield is reached around the tenth year of tapping. A rubber tree is productive for 20 to 40 years, where the length of the productive period is partly determined by the tapping intensity. After the productive period the trees are uprooted (the wood from the rubber tree also offers an attractive return) and replanting possibly takes place. All *Hevea* clones follow a broadly similarly shaped yield curve over time, from the first year of tapping onwards. The different registered clones number in the hundreds, most of them indicated by an abbreviation of the name of the institute, which developed them, supplemented with a number. Clones differ with respect to a variety of factors: average yield, length of productive period, early yield, wind susceptibility, disease and pest resistance and soil and terrain requirement. Most trees in Thailand are RRIM600, a clone developed by the Rubber Research Institute of Malaysia and introduced decades ago. Yield of RRIM600 (produced natural rubber (dry weight) per hectare) is not among the highest if related to currently available clones.

Farmers respond both to the level of the price and to price changes. In this respect it is important to distinguish short-term and long-term supply response. Short-term supply response refers to the immediate reaction of farmers to price changes. The general assumption is that an increase in price leads to larger supply through more intensive tapping. However, a decrease in price may also induce farmers to tap and supply more in order to keep their income at proper levels. Long-term supply response refers to the effect of prices on supply through investment decisions. Since investments in rubber trees will be productive for a period of 20-40 years, with a period of around 7 years at the start with no revenues at all, expectations of future prices and futures returns for extended periods will influence supply. To assist the farmer during the immaturity period of about 7 years, government agencies often provide replanting subsidies (see Section 3.4). During the first three years inter-cropping with e.g. pineapple may provide an additional source of income. For a crop like natural rubber, a low price may result in uprooting for the purpose of replanting with rubber trees or with another crop. This means a short-term reduction in supply. A high price will lead farmers to postpone uprooting and/or replanting so there will be more supply.

An important aspect of the structure of the natural rubber producing industry is the size of the holding, represented by the size of the area planted with rubber trees. Traditionally two types of holdings can be distinguished in cultivation of commodities:

small holdings and estates. The criterion for classifying smallholders and estates in many countries is whether the size of the holding is under or over 40 hectares (or 240 rai[6]). The rationale for this division is the difference between the two groups in ownership, the role of wage and salary earners, efficiency and productivity and access to markets and information. Smallholders are mostly small-scale agricultural households that have earnings from various agricultural as well as non-agricultural activities, mainly as a way to diversify their income risk. Estates, on the other hand, are often large sized mono-crop plantations, usually owned and professionally managed by companies. In Thailand the estate sector is small in terms of production. There are about 3000 estates in Thailand as opposed to more than a million smallholders (1996). The average size of estates is slightly below 400 rai. A large state owned estate (Rubber Estate Organization) makes a considerable contribution to the estate sector. The average size of small holdings in Thailand is around 13 rai.

Processing

Trees are tapped during the night. The fresh latex is normally collected early in the morning. If the latex is not collected it will become solid; this solid substance is called cup lumps. In addition, even after the collection of the fresh latex, residual dripping may give latex, which is collected later as cup lump. Fresh latex may be sold directly to a processing factory. Farmers are paid according to the dry rubber content (drc) of fresh latex. Hence, selling fresh latex requires the determination of the dry rubber content, which is usually done by the buyer. There are crude methods (when buying at the farm) and advanced method (when buying by a co-operative). The drc is influenced by the type of clone, the age of the tree and the time of the year. Generally the dry rubber content varies from 30% to 35%.

Before selling to the manufacturer of rubber goods, rubber is processed in one of the following forms.

1. Unsmoked Sheets (USS): Rubber growers may produce USS by letting the rubber coagulate and pulling the slabs through rollers after which drying is done in open air. USS is normally sold as mixed grade to the middleman who may grade themselves or may sell it to the factory as mixed grade. Most of USS is turned into RSS. A small part may be used for the production of STR (TSR)[7] block rubber.
2. Ribbed Smoked Sheets (RSS): RSS is produced in a smokehouse. Farmers may bring their fresh latex to the smokehouse.
3. Air Dried Sheets (ADS): ADS is produced in small factories using fresh latex from farmers. The market is small as it is only required for a few technical end-uses.
4. White pale crepe, yellow crepe or brown crepe: The different varieties of pale crepe are also produced on a small scale. It is used in various end-products and in producing STR.

[6] One hectare is equivalent to 6 rai.

[7] The Thai denomination STR (Standard Thai Rubber) is equivalent to the international denomination TSR (Technically Specified Rubber). For the sake of completeness we mention both.

5. Technically specified rubber (TSR), in Thailand called Standard Thai Rubber (STR): STR20 (TSR20), the standard tire rubber, uses cup lump or occasionally USS and RSS as input. The better quality STR (TSR) e.g. STR5 (TSR5) is produced from fresh latex.
6. Concentrated latex: Concentrated latex is made from fresh latex using a centrifuging process. Concentrated latex is used for manufacturing of dipped goods (surgical gloves, condoms).

All six types have different grades. In Appendix 3.3 it is shown how fresh latex is eventually converted into processed rubber. The chart also gives rough estimates of the various unit costs of processing (2001 prices). The cost of production of USS from fresh latex is around 1.5 Baht/kg and the cost of production of RSS from fresh latex is around 3.1 Baht/kg. There is a shift to producing more STR20 (TSR20) as this is preferred above RSS3 by most of the tire industry, and, in this respect, Thailand is following other countries. Most popular on the dry rubber side are STR20 (TSR20) and RSS3, both of which are used for tires. It is difficult to obtain a complete picture of the quantitative importance of these different types of processed rubber, because grades and types of processed rubber eventually may be upgraded, downgraded, re-processed, or a combination of these. Table 3.4 shows for 1994 that both registered and utilized capacity of crepe and ADS is marginal, while the larger part of processing capacity is in RSS, concentrated latex and STR (TSR). Exports in 1999 roughly consisted of 60% RSS, 30% STR (TSR) and 10% concentrated latex. Current intervention prices (2001) pertain to USS (unsmoked sheets) and RSS (Ribbed Smoked Sheets): purchases of USS at intervention prices take place at the Central Rubber Markets, and purchases of RSS at intervention prices take place at cooperatives (see also Section 4.4 on the current price intervention scheme).

Table 3.4 Distribution of types of processed rubber production capacity for processing fresh latex in 1994

	registered		utilized	
	1000 tonnes	share in %	1000 tonnes	share in %
RSS	1719436	62.5%	1238723	64.4%
STR (TSR)	410100	14.9%	385096	20.0%
concentrated latex	521130	18.9%	241975	12.6%
ADS	22290	0.8%	25004	1.3%
Crepe	77861	2.8%	33214	1.7%
	2750817	100.0%	1924012	100.0%

Source: Survey of rubber processing factories, RRIT, 1994

Natural rubber is collected as fresh latex, as is described above. This may be sold to a cooperative factory or a private factory. As many farmers deliver their fresh latex to processing factories, a substantial quantity of natural rubber is aggregated at this processing stage. Hence, these processing factories create, to a certain extent, so-called points of constriction points: specific stages in the commodity chain where a substantial number of farmers, but preferably all farmers, are delivering their production to a factory or substantial quantity of the commodity is aggregated to be processed or traded. These

points of constriction are interesting as they offer good opportunities to retail other services (like e.g. price insurance) to the farmers along with the processing of the commodity. Nevertheless, in natural rubber the value of these factories as points of constriction is limited as farmers have many opportunities to deliver their production to alternative processing firms. Additionally and related to this, the capacity of most processing factories is small, both in terms of the number of farmers needed to generate the required inputs to a factory, as well as in terms of the capital required to set up such a facility. Especially compared to other commodities like sugar and palm oil, points of constriction in the commodity chain of natural rubber have a minor value in facilitating the distribution of price insurance.

3.4 Government involvement in natural rubber in Thailand

There are several government agencies involved with rubber development. The main Ministry is the Ministry of Agriculture and Co-operatives. For a review of the Offices and Departments, and also for state enterprises involved in rubber see the chart in Appendix 3.4. The most relevant for rubber are:

- *Rubber Research Institute of Thailand* (*RRIT*). This institute is part of the Department of Agriculture (DoA). It is primarily concerned with research and development of new technologies, and training of officers from other agencies and farmers; it also collects statistics and regularly publishes *Thailand Rubber Statistics*, appearing a few times per year. Finally it runs the central rubber markets.
- *Office of the Rubber Replanting Aid Fund (ORRAF)* was founded in 1960. This is a state enterprise. The agency is responsible for the replanting programs. It also focuses on the development of production quality, which is acceptable to the market, using suitable technologies. Finally it has to develop market mechanisms and farmers' organizations in order to increase the bargaining power of farmers and increase the prices they receive. Due to its central position in the provision of replanting subsidies, this organization maintains an almost complete listing of rubber growers throughout Thailand.
- *Rubber Estate Organization* (*REO*). REO is a state enterprise running an estate comprising 40,000 rai, in two locations near Hat Yai, including an STR (TSR) factory (STR20 (TSR20) and STR5L (TSR5L)), a white pale crepe factory and a smoke house to produce in particular RSS3. REO is responsible for the implementation of the price intervention policy (see Section 4.4). It is also supplies planting material, agricultural tools, fuel and other materials necessary for rubber cultivation and for the replanting programs.
- *Department of Agricultural Extension (DOAE)* was established in 1967. The DOAE plays a very important role in transferring technology and advice to farmers, and is responsible for new rubber planters and for re-planters who have been released from the responsibility of ORRAF. It appears that this organization is more important to farmers of other crops than to rubber farmers.

- *Office of Agricultural Economics (OAE)* is the think tank of the Ministry. Because RRIT (being part of DoA) is the only institute in MoAC doing its own economic work, OAE does not handle the economics of rubber. OAE prepares the 5-year plans, collects data on farm gate prices and calculates cost of production, doing surveys every number of years.

During the 1960's and part of the 1970's several agencies independently tried to tackle the problem of low prices for smallholders and bad rubber quality by organizing group processing to improve the value and bargaining power to get higher prices.

The Rubber Replanting Aid Fund Act in 1960 made ORRAF responsible for supporting the owners of old degraded rubber holdings if they wish to replant their farms with new high-yielding rubber varieties. From 1988 onwards, ORRAF has also been involved in new planting on areas for farmers who had not previously had a rubber holding. ORRAF takes care of all participants replanting and new planting projects during the immaturity period. The grants given by ORRAF are paid in cash for labor costs and in kind for planting material, herbicide, fertilizer, etc., in quantities recommended by RRIT. Farmers who qualify for the rubber replanting aid fund may be paid 42,600 Baht per hectare (7,100 Baht per rai) over a 5□ year period. Farmers who qualify for other perennial crop replanting aid fund (e.g. replace rubber by oil palm or fruit trees) may be paid 42,600 Baht per hectare (7,100 Baht per rai) over a 4□ year period. For rubber planting in a new area, ORRAF will pay for aid at 28,800 Baht per hectare (4,800 Baht per rai) over a 5□ year period. The rubber replanting aid is funded from the rubber export tax levied at the point of export. The government funds subsidies for new rubber area. The main services of ORRAF in this context are:

- surveying the farmer's land;
- providing material inputs (fertilizers, planting materials, herbicides, insecticides);
- inspecting the farmer's holding;
- providing grants;
- providing training courses.

In addition to these incentives for replanting and new planting, the Thai government contributed to improving the marketing of smallholder rubber. After many years of efforts by the extension services to inform the farmers about the importance of quality, the establishment, in 1991, of rubber auctions throughout the country was a major step towards the improvement of marketed quality. The central rubber markets are run by RRIT. The main central rubber market is located in Hat Yai, and there are also CRM branches in Surat Thanee and Chasoengsao. Trading facilities are provided for small farmers, including auction, grading, weighing and financial intermediation. Throughout the country numerous local rubber auction markets have been established, which apparently contribute to better prices for growers and to the emergence of a system of payment according to quality.

Chapter 4 Markets, prices, price risks and price risk reduction

4.1 Operation of Local Rubber Markets

The important physical (auction) market is the Central Rubber Market (CRM). The GoT (RRIT) set up the first CRM in the southern commercial center of Hat Yai in 1991. Subsequently additional branches in Surat Thani and Chasoengsao were established. In addition there are numerous 'local markets' organized variously by ORRAF, other institutions or by local private groups. Depending on the local, situation different grades may be traded, in particular USS3 and RSS3. The three CRMs are of similar sizes, but the most important in terms of provision of a reference price is the Hat Yai CRM. CRM prices form the reference price for around 70% of overall rubber transactions.

The aim of the CRM was to establish an open and transparent center for rubber buyers and sellers to meet in which farmers could sell in greater confidence. The CRM lays down rules and regulations, grades all rubber brought to it, and monitors quality in an apparently rigorous manner according to international standards. Rubber rejected by the CRM as failing to meet quality standards is sold on the town market, where it is generally reprocessed. The establishment of CRMs clearly is helpful to smallholder farmers as they often see themselves as being exploited by powerful and concentrated buyers and by cunning middlemen.

Rubber is generally sold by small farmers to local traders. Local traders in turn sell to the town traders who sell to exporters. Some farmers sell directly to the town merchants themselves. Farmers also may supply latex directly to latex processors, particularly in the south where a number of surgical glove factories are located. Of the group of farmers that come to the central rubber markets only a limited fraction is entitled to receive intervention prices. Only those farmers who satisfy the full requirements for registration for intervention purposes obtain the required certificate. These requirements pertain to maximum area and production (in particular area should be equal or less than 50 rai or production equal or less than 100 kg fresh latex - see also Section 4.4). This rubber automatically receives the intervention price. Intervention purchases are transported to a local (private) factory where the sheets are smoked and packed for storage on behalf of the Rubber Estate Organization (REO).

The remainder of the rubber is auctioned. Auctioned grades are USS1, USS2, USS3, USS4 and mixed (which is 60% of total production volume). Buyers have sufficient confidence in CRM grading and quality control, for much of their bidding to be by telephone. The highest bid for each specified quality receives the entire volume available that day, less any purchases by the intervention authority. With high volumes, rubber may be auctioned in two lots. Auction deals are settled by immediate cash payment. We understand that auction prices are often significantly higher than local town prices, and it seems that this premium reflects the consistency of CRM quality.

Both buyers and sellers at these markets are well-informed on developments in local and international markets. A committee established by the Ministry of Agriculture

Cooperatives and the Thai Rubber Association announces rubber prices daily. These official Thai rubber prices - noon prices fob Bangkok and Hat Yai for RSS1-5, STR 5L, STR5 and STR 20 as well as 60% latex concentrate price and the USS1-4 prices from Hat Yai CRM - are disseminated throughout the country and the rest of the world through Reuters and Telerate. Thailand has a modern and sophisticated communications system. Official prices are widely disseminated in newspapers and on the radio. Information on prices is available to farmers in various ways. When operative, the rubber intervention price, which only changes occasionally, is general information. Local traders and middleman, with direct links to the relevant Central Rubber Market, play an important role in transmitting price information to the farmers.

The CRMs, in particular that at Hat Yai, are important for our proposal in that they allow the price insurance contracts to be written in terms of clearly defined local rubber prices which relate closely to those the farmers will actually receive. We will propose that contracts are written in terms of monthly averages of the Hat Yai CRM daily price. These averages are well-defined, non-manipulable and widely publicized. Writing insurance contracts in terms of CRM prices avoids costly monitoring problems associated with insuring the prices actually received by farmers.

4.2 Price Development and Price Volatility

The price of natural rubber has fluctuated substantially. Over the period 1990-2000, prices started low, with of minimum of $ 0.73 for TSR20, Singapore, in October 1990 (see Figure 4.1). The maximum for 1990-1993 was $ 0.85, reached in May 1993. In 1994 prices started to increase to a level of $ 1.85 in February 1995. However, the average for the month July 1995 was only $ 1.27. Prices remained above $ 1.00 until 1997. Then the Asian Crisis led to strong devaluation from 25 Baht/$ eventually to around 40 Baht/$. This gave (initially) higher local prices in producing countries, leading to an increase in supply. Prices went down until they hovered around $0.60.

During 1991-1993 the local price in Hat Yai was in the range of 15.50 Baht/kg to 17.50 Baht/kg. Then came the steep rise to a maximum of over 39 Baht/kg in March 1995. However, the average for the month August 1995 was only 25.73 Baht/kg. Prices declined to a minimum of on average just over 20 Baht/kg in July 1997, the month when the Asian Crisis started. Prices remained above 20 Baht/kg until October 1998. Then they declined further reaching a trough of on averaged 15.82 Baht/kg in August 1999 to recover to levels of around 20-24 Baht/kg in the 2000. So, also in the local market strong volatility is apparent.

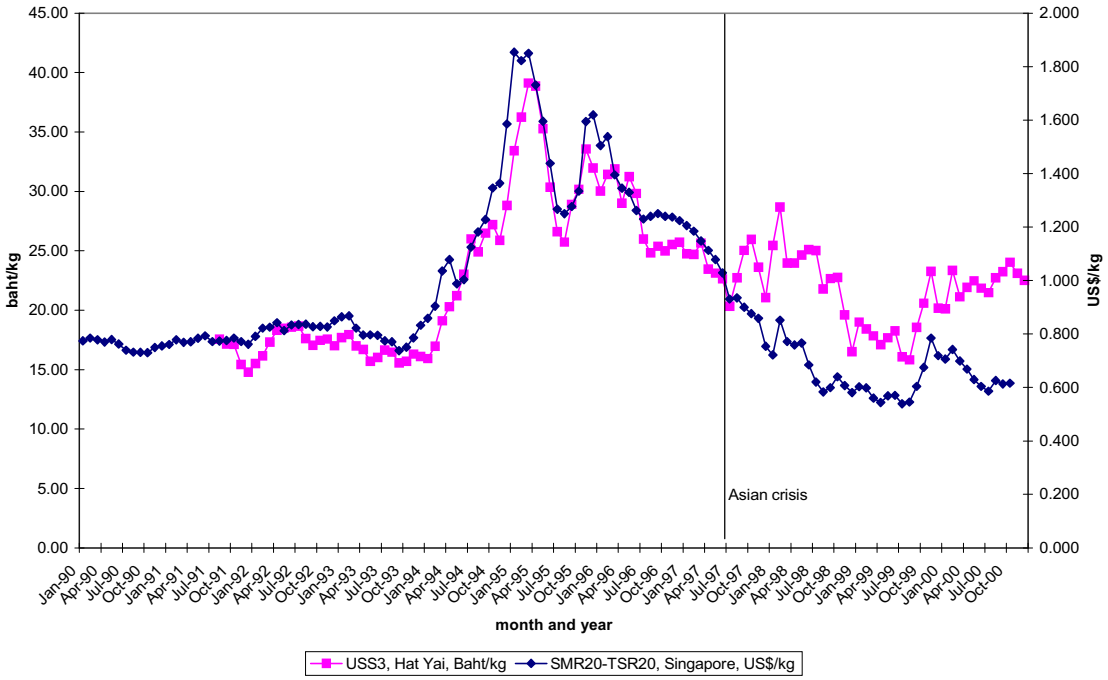


Figure 4.1 Price development of natural rubber in Thailand (source: RRIT/IRSG)

In order to get an impression on the volatility of prices, we have calculated the coefficient of variation and two other measures of volatility (see Table 4.1) [8]. On the basis of **monthly** data for the period 1990-2000 we observe a volatility of 24.5% for Thai domestic prices (USS3, HAT Yai, Baht/kg) and a CV for world market prices in Baht (RSS1-TSR20, Baht/kg) that is very close to this value (23%-24%). Expressed in US$ the CV is substantially higher in US$ (in particular 29.2% and 35.2%)). Other measures of volatility (in particular mean absolute percentage deviation) show comparable values.

Table 4.1 Price volatility of natural rubber by various measures
(nominal, monthly prices, January 1985-December 2000)

	Thai prices		**World market prices**					
	Bangkok RSS3, fob, Baht	Hat Yai USS3, Baht 1)	Singapore RSS1, S$	Singapore RSS1, US$	Singapore RSS1, Baht	Singapore TSR20, S$ 2)	Singapore TSR20, US$ 2)	Singapore TSR20, Baht 2)
CV	25.4%	24.5%	24.6%	29.2%	23.2%	28.3%	35.2%	24.1%
MAPD	20.9%	19.7%	20.1%	22.8%	18.7%	23.0%	29.6%	19.9%
5MA-MAPD	18.9%		25.0%	26.9%	20.3%			

CV = Coefficient of Variation; MAPD = Mean Absolute Percentage Deviation (Newbery and Stiglitz, 1981, p. 286); 5MA-MAPD = Absolute percentage deviation from 5 years moving average; source: own calculations, IRSG, RRIT
1) sample period: 08.91-12.00; 2) sample period: 05.92-12.00; 3) sample period: 01.90-12.00.

[8] The squared coefficient of variation is calculated as CV(P)=VAR(P)/(AVERAGE(P)^2) and is widely used as an indicator of volatility as it is dimensionless.

It is sometimes put forward that volatility measures based on monthly data exaggerate the degree of volatility in commodity markets, and poorly measure the medium term frequency component of volatility. This is particularly important because price fluctuations in the medium period are considered to be most costly (Newbery and Stiglitz (1981, p286). In order to eliminate the potential impact of high frequency fluctuations, we have also calculated volatility on the basis of annual data, rather than monthly data (see Table 4.2 and Figure 4.2).

Table 4.2 Price volatility of natural rubber by various measures
(nominal, annual prices, 1975-2000)

	RSS1, S$	RSS1, US$	RSS1, Thai Baht,	TSR20, S$,	TSR20, US$,	TSR20, Thai Baht,
CV	26.9%	26.8%	25.0%	27.1%	25.3%	23.2%
MAPD	21.3%	20.8%	18.7%	21.7%	19.6%	18.5%
5MA-MAPD	18.6%	20.3%	15.3%	18.3%	19.8%	15.9%

Source: own calculations, IRSG, RRIT

On the basis of annual data for the period 1970-2000 we observe a volatility of 26.8% for international prices (RSS1, Singapore,US$/kg), and this value decrease slighly if prices are expressed in Baht (but much less than in the case of monthly data). The values of the coefficient of variation as presented in Table 4.2 are medium relative to the coefficients of variation of other commodities: these range from 14.7 for tea to 109.1 for sugar (see Newbery and Stiglitz (1981)).

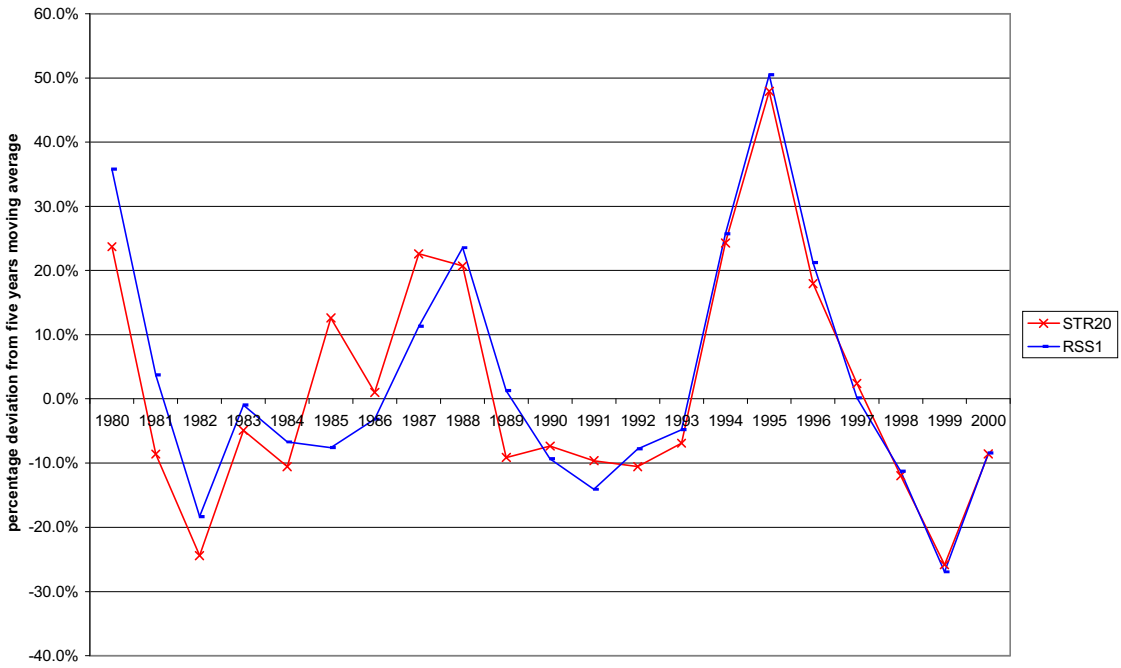


Figure 4.2 Volatility of natural rubber prices (source: IRSG)

Five year moving averages of either the coefficient of variation or the mean absolute percentage deviation of natural rubber prices in Baht (not shown) indicate that volatility steps up in the last half of this decade, since 1994-1995 (in case of the CV to a level of around 30%, almost twice as high as before 1995; in case of the MAPD to a temporary peak of more than 100% in 1995 to return to before 1994 levels of below 20%). These calculations also make clear that the volatility of natural rubber prices in US$ has increased after the 1997 crisis, while the volatility in Baht has decreased.

4.3 Possible size of risks along the trade chain

Farmers protect themselves in various ways against income risk as a result of price fluctuations ranging from precautionary saving, storage of commodities, diversification of income by cultivating a variety of crops, by having an income outside agriculture, cultivating subsistence crops, etc. Sharecropping is just another form of income diversification for owners of rubber plots: many owners of rubber land leave the tapping to tappers, while some owners hire tappers on the basis of a wage, mostly the hiring of tappers is done on a sharecropping basis. Sharecropping – the organisation of natural rubber production where owner and tapper agree on a contract how to distribute the proceeds of the revenues from rubber - appears to be widespread. The formula for splitting the revenues may be 70/30 or 60/40 or 50/50. The proportion of the crop for the owner is respectively 70%, 60% or 50%, while the other part is for the tapper. The choice of the system depends on the type of natural rubber produced: just producing latex and just delivering it to a factory is less labor intensive than producing USS. There may be correction to this if the land is hilly, if the trees are old and therefore less productive or if prices are very low. In all the cases the tapper would be given a somewhat higher percentage. In the case of cooperatives, the owner benefits from profit from the co-operative and it appears that this is partly translated into a higher share from the tapper. These proportions are apparently “known” and are not (or not easily) altered. Sharecropping implies that the tapper shares risk with the owner of the land. In case the tappers receive a higher share because of low prices, this would pass risk back from farmers to landlords.

The widespread prevalence of sharecropping is confirmed by several interviews with experts on the natural rubber economy as well as rubber growers and cooperatives. However, we do not have exact figures on the prevalence of share cropping in natural rubber growing and, hence, it will be difficult to go beyond generalities since both the extent of sharecropping and the precise sharing arrangements vary from region to region, and from village to village within regions. On the basis of a survey among cooperatives (see also Section 5.1) it is observed that, on average, close to half of all members of cooperatives are sharecroppers (48.7%). Sharecroppers in cooperatives appear to make more use, on average, of banks, but they also appear to be less willing to pay for market based price insurance (see also the appendix to Section 5.1). This

information focuses on the sharecropping among members of cooperatives and, unfortunately, provides little information on access of sharecroppers to credit.

In advanced economies bank credit may also be used to overcome temporary fluctuations of income, but it is unclear if and to what extent these options are open to smallholder rubber growers in Thailand. Given the relatively friendly conditions for loans through BAAC (see also Section 5.3), but also the increasing importance of saving and credit arrangements within cooperatives, credit appears to have this function at least to some extent. Finally there may be a reliance on government intervention whenever the returns in agriculture in general, and in our case in natural rubber cultivation, tend to fall below subsistence levels.

4.4 The rubber intervention scheme in Thailand: operation, and costs & benefits

The Thai intervention scheme for rubber has been operative since 1997. It has evolved over this period as the result of some early problems. The scheme is operated by the Rubber Estate Organization (REO). REO was originally established in the 1940s as a large state owned enterprise for the production of natural rubber. It operates under responsibility of the Ministry of Agriculture and Cooperatives. Its main activity is running a large estate with an area under rubber of around 40,000 rai (around 6,667 ha) and a large processing factory, currently consisting of 3 processing units, and all located in Changklang (Nakorn Sri Thamarat province), in the south of Thailand. The capacity of REO's processing units is high compared to the average capacity of processing units in the cooperative or private sector. To keep the factories running a large share of its input of fresh latex (around 50%) is required from local farmers, outside the production of REO's own estate.

REO's activities concerning the price intervention scheme are administratively separated from their main business of producing and processing activities. In order to run the scheme REO takes a loan from the state-owned Krung Thai Bank Public Ltd. (KTB). KTB currently charges on average 8% interest on these loans. This loan is transferred to the Department of Agricultural Extension, which then distributes it via the Department of Co-operatives to 259 local intervention points (the three central rubber markets, rubber processing cooperatives and ORRAF district offices). Purchases of rubber from local farmers take place at these intervention points. Under the scheme, only small sized farmers, defined as having an area of no more than 50 rai, or a production not more than 100 kg fresh latex per day, are allowed to sell their production to the intervention authority. These smallholders are registered at ORRAF as small farmers. When intervention takes place, it covers around 10% of total production.

Purchases of rubber by the intervention authority are subsequently and if necessary processed into RSS. This processing may take place at the REO factory, but in some areas (e.g. purchases at the Central Rubber Market from Surat Thani) is undertaken by

a local (and possibly private) processing unit on behalf of REO. The processed rubber, packed in bales and imprinted with a GI (**G**overnment **I**ntervention) stamp is sent to RRIT warehouses in Songkhla, Krabi, Surat Thani and Chasoengsao, each with capacity of 80 – 100,000 tons. If these are insufficient, private warehouses can be used. Sales are under the authority of the REO.

The intervention price is determined by the Ministry of Agriculture and is based on estimated costs of production. These costs of production are currently assessed on the basis of a 1995 farm survey. Current production costs are obtained by extrapolation of 1995 cost components. There must be a worry that this method of estimating costs fails to make allowance for productivity advance.

The size of the intervention stocks is not public information. REO has stated to us that the maximum size of the inventory was 160,000 tons in October 1998. We believe that this figure may be too low. REO further claims that, in 2000, 230,000 tons was released and the stock was cleared at the end of 2000. Some exporters believe that 300,000 tons of stock, bought in 1997 and 1998, was sold on the international market during 1999 at a price of up to 30% lower than the original purchasing price. Since intervention covers only around 10% of total production at any time, the remaining rubber is sold at the local market price, which may nevertheless be affected by intervention (see below).

We have attempted to evaluate the benefit to farmers from the intervention scheme, and also the costs of the scheme. The detailed calculations are set out in Appendix 4.4. Over the four year period 1997-2000, farmers benefited by a net 2325 million Baht. This is equivalent to the gain had there been no intervention and the rubber price had been an average of 0.27 Baht/kg or 1% higher. This benefit is relatively modest. It has two components:

- the direct benefit to those farmers who were able to sell at the intervention price;
- the indirect benefit to farmers selling at local market prices which were higher than they would otherwise have been as the result of intervention.

We estimate that these two effects were of the same order of magnitude. Farmers selling at the intervention price obtained an average of a little over 1 Baht/kg on intervention rubber, while the price of non-intervention rubber was on average higher by 0.18 Baht/kg as the result of the intervention. The former effect is valuable improvement for a small group of producers who nevertheless include some of the poorest farmers, while the latter effect gave a small element of support to a much larger group of farmers.

The intervention scheme imposed four sets of costs:

- the direct budgetary cost to the GoT as the result of purchasing rubber at the intervention price and selling at (or possibly below) the world market price;
- the costs to Thai rubber processors and exporters who have been obliged to purchase unprocessed rubber at an inflated domestic price but who sell the processed rubber at the international price;

- costs associated with the production of rubber for sale under intervention which would not have been economic if it had been sold at the market price;
- welfare costs associated with loss of producers' and processors' (consumers') surplus.

We estimate the budgetary cost as 1115 million Baht over 1997-2000 and the cost to processors as 1247 million Baht. These costs are largely transfers to farmers and hence are not costs to the Thai economy. The estimates imply that the GoT bore about 45% of the costs of intervention, and the processors around 55%. This is a very substantial burden on the rubber processing industry which even in good times enjoys only narrow margins.

The two remaining elements of costs are smaller, but are net costs to the Thai economy in the sense that they are not associated with any offsetting benefits. we estimate that the intervention scheme increased Thai rubber production by an average of 39,000 tons per annum over 1997-2000 (approximately 1.8%). This increase in production was the result of two effects

- farmers able to sell under intervention produced additional for this purchase – approximately 40% of rubber purchased under intervention would not otherwise have been produced;
- non-intervention farmers producing more rubber than otherwise because of the effects of intervention in raising Thai prices relative to world levels.

This increased production imposed welfare costs totaling 45 million Baht over 1997-2000. The second element of welfare loss is loss of processors' profit opportunities (processors' surplus) as the consequence of the artificially high local price. This amounted to 54 million Baht over the four year period. Together with a small third element of cost (loss of producers' surplus), the total deadweight loss from intervention amounted to 101 million Baht over 1997-2000, 4.3% of total producers' benefit.

These cost calculations are likely to underestimate the true costs of the scheme:

- They assume rubber brought under intervention was immediately resold at the world market price. They therefore do not take into account storage, deterioration and interest costs. Neither do they allow for the possibility (for which there is anecdotal evidence) that intervention rubber was sold below world prices. On the other side, they also fail to allow for the fact that the government may have used its inventory to successfully speculate on movements in the world price.
- Thailand is the world's leading producer and exporter of natural rubber. A 1.8% increase in Thai production in a world market already characterized by excess supply will have depressed world prices. It is quite plausible that this effect was large enough to completely offset the indirect benefit to Thai producers of non-intervention rubber, estimated at 0.16 Baht/kg. If, as we suspect, this is the case, and we are undertaking further calculations in this respect, the only beneficiaries of the scheme will have been the farmers selling into intervention, and the costs of the scheme to the government, to processors and in welfare inefficiency will turn out to

be around double the benefits to Thai farmers. The ultimate beneficiaries of the scheme will turn out to have been rubber consumers throughout the world who will have enjoyed the lower prices resulting from the Thai government subsidy.

4.5 Existing Rubber Futures Markets

Futures contracts for natural rubber are currently traded on an active basis in Singapore (SICOM), Tokyo (TOCOM) and OSAKA (OME)[9]. In Japan, the Osaka Mercantile Exchange (OME) is smaller than TOCOM: the trading volume in RSS3 contracts of OME has experienced a decrease relative to the trading volume of these contracts on TOCOM from 60% in 1990 to 20% in 1998, which makes TOCOM the first futures exchange in Japan to consider. Most likely the yen denominated OME contract will also be arbitraged effectively with TOCOM in case of diverging price developments. A quite distinct issue, however, is OME's initiative to introduce a TSR20 contract in cooperation with SICOM with Singapore delivery. In view of the increasing quantitative importance of TSR20 (see also below), this initiative may open additional hedging possibilities that fit in the proposed price insurance. Nevertheless, in the remainder of this section the investigations are limited to futures contracts of TOCOM and SICOM.

TOCOM and SICOM specify delivery of smoked rubber sheet: SICOM trades RSS1 in US dollars while TOCOM trades RSS3 in yen. In practice, the higher specification RSS1 is no longer manufactured in significant quantities, so both markets may be regarded as pricing on an RSS3 basis. SICOM also has a contract in technically specified rubber (TSR20), and this is now the more active of the two SICOM rubber contracts. SICOM contracts extend to over one year ahead while TOCOM contracts extend tot 6 month ahead.

Rubber manufacturing is increasingly moving from smoked sheet to technically specified grades, and there is general agreement that futures trading will move to technically specified contracts in coming years. In 1999, 61% of Thai natural rubber exports were in the form of smoked sheet, and 29% as technically specified rubber (the remainder being centrifuged latex). In general the last decade has seen action being reduced in particular on futures markets in Europe and the USA. Some of the reasons for this are:

- The shift in growth of consumption of rubber away from Western Europe and the USA, e.g. to countries in South-East Asia.
- The increase in direct trade: direct trade, especially by European and American firms is said to cover over 70% of all purchases.
- The move away from smoked sheet to technically specified rubber undermined the pricing basis of the London and New York futures contracts. Because the Japanese industry has remained less vertically integrated and more dependent on smoked sheet, these changes had less effect on Japanese rubber futures markets.

[9] Previously active markets in London and New York have been closed for over two decades.

There is some disagreement about the relative attractiveness of the SICOM and TOCOM markets. Japan is the single largest export destination for Thai rubber (27% in 1999) and this might be thought to argue for TOCOM as the better hedging environment. However, rubber exports are typically priced (up to nine months) forward on a dollar basis, and this makes a TOCOM yen hedge more cumbersome than a SICOM dollar hedge. Furthermore, there is a widespread view in Thailand that the TOCOM market is unduly speculative and that SICOM provides the more reliable pricing basis. This view is reinforced by the fact that the SICOM RSS1 contract allows Bangkok as an alternative delivery location to Singapore (subject to the agreement of both the long and the short).

TOCOM has seen both declining volume and open interest over recent years, but this decline now appears to have stabilized, and there has been significantly increased volume since mid-2000. However, it is unclear whether this decline in activity represents a secular trend away from the rubber futures market, or is simply the result of a temporarily low level of price volatility resulting from flat market conditions. But despite these declines, TOCOM rubber futures activity levels remain very healthy compared with activity on comparable European and North American futures markets for tropical agricultural commodities.

SICOM activity levels are substantially lower but this in part reflects a different trading structure. In SICOM, trading is through registered market makers. Currently, only around seven market makers are active in rubber, a number which has been broadly stable over a number of years. Market makers can either deal with each other by telephone and then report deals through the exchange, or can trade in one of two seven minute electronic ring systems, the first held in the morning and the second in the afternoon. The closing price is the final price of the afternoon ring.[10] In practice, most deals are reported through the exchange with little liquidity in the ring. However, SICOM officials emphasized to us that ring prices are, nevertheless, representative, since market makers are "well-behaved" and when on occasion ring prices do appear to get out of line, this does generate activity.

The need to access SICOM through a market maker and the relative large size of SICOM deals both work to make SICOM unattractive to speculators. SICOM is therefore very much a trade market. By contrast, TOCOM has the reputation of attracting large numbers of (primarily Japanese) small speculators. The industry view, both inside and outside Thailand, is that SICOM provides the better marker price for international transactions in natural rubber. Relative trading volumes may therefore not provide a clear guide to relative importance in price discovery. Our calculations (see Appendix 4.5) do indicate that TOCOM provides a poor hedging basis for unprocessed rubber in Thailand. Despite this, there must be significant worries as to whether SICOM could

[10] This structure is very similar to that of the London Metal Exchange (LME), which uses a mix of inter-broker deals and (five minute open outcry) rings. Only LME ring-dealing members can deal on or through the LME. Currently, there are around 15 ring-dealing members. The LME aluminium and copper contracts are highly liquid, so no direct inference is possible from SICOM's trading structure to its liquidity.

absorb the additional hedging volumes which may be generated by the proposed price insurance scheme.

There is currently no significant activity in traded options on either SICOM or TOCOM. This implies that if an intermediary were to write OTC puts, it would need to offset these positions by selling futures. A "dynamic hedging" strategy of this sort would enable the intermediary to offset its so-called "delta risk" (i.e. it could ensure that it always held a short futures position such that its net OTC plus futures position had zero price exposure), but would leave it to carry its "gamma" and "vega risk" [10]. Of these, the vega risk, which relates to changes in the rubber price volatility, is probably the more important. Gamma and vega risk can only be offset by taking offsetting positions in other (typically exchange) options. For some wholesale institutions, the lack of traded rubber options might form an absolute impediment to offering OTC puts, while for others it would be a risk which would be reflected in the premium sought for the put.

4.6 The Proposed Bangkok Agricultural Futures Market

There has been discussion over a period of at least twenty years about the possibility of establishing an agricultural futures market in Bangkok. A permissive law was passed in October 1999 allowing the creation of such an exchange, and this law became effective in April 2000. It is currently proposed that futures trading will take place in natural rubber, rice, shrimps, sugar and tapioca. A process is in place which should see the early appointment of consultants who will advise on contract specifications, trading systems etc. Steps are also being taken to establish a regulatory body, independent of government. The Department of Internal Trade, which is part of the Ministry of Commerce, is responsible for these developments. In parallel, a second initiative, under the auspices of the Ministry of Finance, aims to establish a separate Bangkok financial futures market which would have its own (again independent) regulator.

[10] The delta of an option is the derivative of the option price with respect to the price of the underlying asset , which in this case is the price of the natural rubber futures contract of the appropriate maturity. A rise in the rubber futures price makes a put less valuable in proportion to the put delta, while a fall makes it more valuable in the same proportion. The writer of the put can offset his delta risk by selling delta futures contracts for every put written. For example, with a delta of 0.5, he would need to sell 50 futures contracts for every 100 puts written. This hedging strategy is complicated by the fact that the delta is not constant – it is highest when the option is near-the-money (i.e. the futures price is near the put strike price) and lowest when the put is either in-the-money (futures price less than the strike price) or out-of-the-money (futures price greater than the strike price). The put gamma measures the sensitivity of the delta to the futures price. Gamma risk is the risk that a delta hedge will not be fully effective in the event of a large price change. The writer of an option can only offset gamma risk by purchasing options with offsetting gammas – e.g. the writer of OTC puts could offset gamma risk by purchasing exchange puts or calls. Vega risk measures the sensitivity of the put price to changes in the volatility of the natural rubber futures price. Again, the writer of rubber put options can only offset the associated vega risk by purchasing other rubber options. It follows that, in the absence of traded rubber options, it is very difficult for the option writer to offset his gamma and vega risk through exchange transactions.

The possibility of rubber futures trading in Bangkok is important in relation to the price insurance initiative in that it has the potential to allow the wholesale insurance provider to offset its risk position, and specifically its basis risk, more easily. If the intermediary were able to trade on the Bangkok market, it would no longer face either currency or location basis. Of course, the currency and location risks do not disappear, but the Bangkok futures market would allow them to be held by institutions which choose to take positions in these markets. Typically, specialized exchange "locals", who may either be firms or individuals. The consequence is that the intermediary is no longer forced to take these components of risk. Since the transaction is now much less risky, it will be able to charge a substantially lower premium. Our view is that, to the extent that the wholesale intermediary will wish to offset positions on futures markets, it is important that a liquid Bangkok futures market comes into existence. We do not think it is realistic to plan on the basis of liquid trading in natural rubber futures on the Bangkok exchange within the next two years.

The current Thai exchange controls regime, which we consider in Section 4.7, reinforces this view. There we argue that success of the proposed Bangkok exchange presupposes some relaxation of current exchange controls. There is no indication that this will necessarily be forthcoming. Furthermore, despite the current governmental activity in connection with the proposed futures market, we encountered considerable scepticism in the private sector that government will provide the necessary urgency and resource commitment to ensure rapid implementation of these plans.

In a number of respects, the advantages obtainable from a Bangkok futures market could be attained more simply from increased liquidity on SICOM, in particular if this were associated with a change in the delivery specifications of SICOM rubber contracts so that they more accurately reflect Thai conditions. In addition, it has been suggested to us that international banks, and perhaps also internationally-based speculators, might be happier taking positions on the established SICOM market than on a new Bangkok market. It nevertheless remains true that the BoT would need to open an exchange control window in order that Thai-based individuals and companies could take advantage of increased SICOM liquidity.

4.7 Exchange Rate Convertibility

Thailand maintains capital market controls and the Thai Baht is only convertible on a limited basis. The BoT is responsible for administration of these regulations, and foreign exchange transactions are only permitted through authorized banks. There is general consent that exchange controls have strengthened in the aftermath of the Asian Crisis. This strengthening appears motivated by the view, widespread in both official and unofficial circles, that the crisis was, at least in part, caused by capital volatility. In our experience, officials, rightly or wrongly, tend to take a demonic view of speculation.

Exchange controls differ between residents and non-residents.

- Non-residents (individuals or companies) can purchase Baht freely, and can remit these funds without restriction. However, permission is required from the BoT to repatriate any profits. Decisions are made on a case-by-case basis. We understand that this permission is normally given, but this typically takes around one week. The result is a significant transaction cost on outward flows.
- Thai residents are obliged to deposit all foreign currency, including proceeds from exports, in accounts with authorized Thai banks. The size of these accounts is limited to $5m for corporates and $500,000 for real persons. All debits, except those for imports, require supporting evidence. Real persons may only purchase currency for foreign travel of up to 50,000 Baht ($1,200) (500,000 Baht for travel to neighboring countries). A concession permits companies to transfer up to $10m annually to overseas subsidiaries, and persons to transfer up to $100,000 annually to non-resident relatives. These restrictions imply that convertibility is highly limited for Thai residents.

The overall effect is that the convertibility regime is a significant nuisance, but not a serious impediment to business, for foreign companies, but is highly restrictive for Thai resident persons who have very limited access to foreign exchange. In particular, Thai residents cannot easily diversify portfolios into overseas assets. This is ironic since overseas diversification would have softened the impact of the Baht devaluation over the past four years.

The impact on Thai-domiciled companies is more complicated. In practice, many companies, particularly those involved in exporting (including the export of natural rubber) keep a proportion of their currency earnings in offshore bank accounts, and use these accounts to finance routine foreign exchange transactions without recourse to the BoT. Legally, this appears to be a grey area. BoT regulations require repatriation of export earnings within 120 days, but do not appear to specify whether these earnings may be used in the interim. In any case, the practice appears to be tolerated even if its strict legality is not admitted.

The activity which is most obviously penalized by current exchange control regulations is trading in non-Baht securities. Thai residents are, for example, currently prevented from trading on overseas stock exchanges. This is of relevance to the proposal we are considering since similar restrictions would appear likely to apply to trading on overseas commodity futures markets. In particular, it seems unlikely that the proposed Bangkok agricultural futures exchange will attain sufficient liquidity to ensure viability unless there is some relaxation in exchange controls. Liquid trading of any futures contract requires that the market for that contract be attractive to both hedgers and speculators. Current regulations will severely limit the attractiveness of the market to speculative capital in two respects:

- Non-resident speculators will be discouraged by the requirement to seek BoT permission to repatriate profits, in particular since it appears that this consent would be required on a transaction-by-transaction basis. This will, for example, make it impossible to trade Thai futures from a normal futures account.

- Resident speculators will be unable to participate in arbitrage business between the Bangkok and overseas futures markets (TOCOM and SICOM in natural rubber) unless they have access to offshore accounts. As noted, offshore accounts are only easily available to exporting companies, and even then their legal applicability to this type of business is, at best, uncertain. The result will be that the arbitrage business, which is potentially highly profitable to locals, will largely be in the hands of non-residents. In our view, this will severely limit the liquidity of the Thai market, and is likely to result in a poor hedging basis – in rubber, for example, Bangkok prices will not correlate highly with prices on the world market.

Viability of the proposed Bangkok futures market will require that the BoT makes a concession for futures trading. The required concession is relatively simple – individuals and firms (resident and non-resident) who wish to trade in futures should be able to apply in advance for a facility to trade these contracts thereby obviating the current requirement to apply on a transaction-by-transaction basis. This facility would be for a specified period of time (e.g. twelve months) and up to a specified (end of day) size (e.g. $500,000 for real persons, and $10m for companies). Such a facility would not imperil the current objectives of exchange regulation, but would require the authorities to take a more relaxed view of the effects of futures speculation.

We discussed this possibility with the BoT, but officials were unwilling to speculate on their likely position in advance of a request from the appropriate sponsoring ministry, in this case the Ministry of Commerce. In our view, sympathetic consideration of such a proposal, once made, will be important in ensuring that the premia charged in any rubber price insurance scheme are affordable.

4.8 Basis Risk

A rubber processor selling on TOCOM faces two components of basis risk:

- TOCOM prices relate to market conditions in Japan, and these may differ from those in Bangkok. The relative price of rubber in Tokyo and Bangkok is the location basis, and uncertainty relating to the movements of this basis is *location basis risk*. Location basis risk cannot easily be offset.
- TOCOM prices are in yen, while a Thai processor is concerned to offset dollar-based forward contracts. TOCOM and Bangkok prices can move relative to each other because of fluctuations in the yen-dollar exchange rate, and the uncertainty associated with these movements is *currency basis risk*. Currency basis risk can be offset by taking appropriate positions in the currency forward or futures market.

SICOM futures contracts are denominated in US dollars and, hence, basis risk should be less for SICOM hedges since these would not imply currency risk. In principle, SICOM's Bangkok delivery option also implies that there should be little location basis risk, although in practice this option appears too qualified to be effective. We return to this issue below.

An intermediary offering Baht-based price insurance to Thai farmers and using either SICOM or TOCOM would take on both location and currency basis risk, and in addition would take on the risk of relative movements of the prices of smoked and unsmoked rubber (*processing basis*). In Appendix 4.5, we show that these basis risks are in total large for TOCOM with the consequence that an intermediary offering price insurance to Thai farmers would be able to offset only around one half of its risk by using TOCOM futures. Our estimates suggest that location basis risk is the largest component of the overall basis between unprocessed rubber in Thailand and processed rubber in Tokyo. SICOM appears to offer the better hedging basis for a Thai price insurance intermediary provided that SICOM has sufficient liquidity and the Baht-dollar can be hedged adequately

Taking the three components of basis risk in turn:

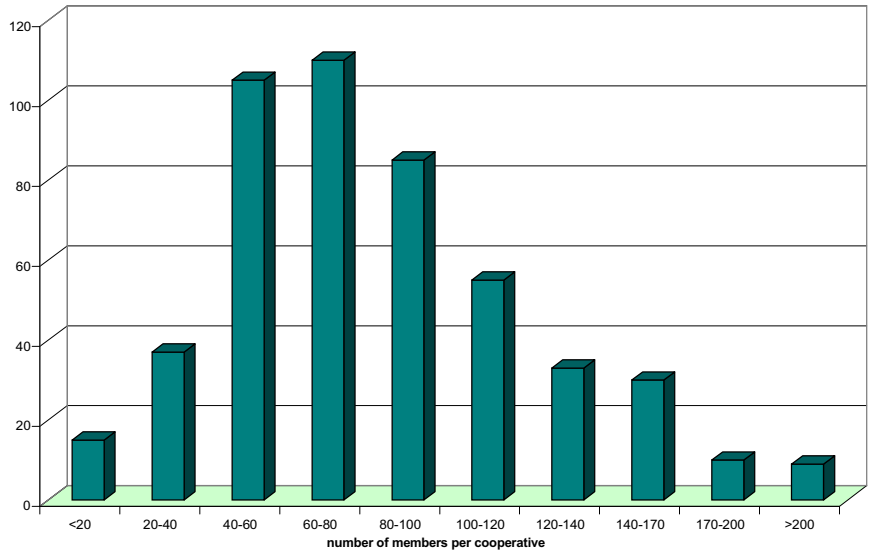
- *Processing risk* is unhedgable but (we believe) small. Discussions confirmed that wholesale intermediaries would not wish to take on this component of risk, and it would therefore have to be carried by the retail intermediary (BAAC) who would need to make the necessary provisions.
- *Currency risk* appears moderately large but is hedgeable. Forward Baht-dollar spreads are of the order of ± 0.20 Baht/dollar and this would be a significant component of the overall insurance premium. The relatively high forward spread is almost certainly a consequence of Thai currency controls – see Section 4.7.
- *Location risk* is large relative to TOCOM but much smaller relative to SICOM. Location risk on SICOM could be further reduced if the exchange were willing to modify their contractual delivery provisions to give the short the option of selecting the delivery point (Bangkok or Singapore). This is because if the proposed insurance scheme becomes operative, there is likely to be an increased level of Thai-based short hedging. If the short has the delivery option, he will choose to take delivery in Bangkok if the SICOM price at contract maturity is less than the local price in Bangkok, but otherwise not. This will effectively tie the SICOM price to Bangkok market prices, even if, as presently, only a small proportion of futures contracts go to delivery. SICOM have indicated that they would be willing to consider modification of these provisions.

Chapter 5 Suitable candidates for a price insurance transaction

5.1 Co-operatives and willingness to pay

In an effort to improve the quality of rubber produced, to increase the bargaining power and to enhance the prices received, ORRAF obtained funds to set up co-operatives with a processing center. These co-operatives in many cases originate from a natural group e.g. a group collecting the individual farmers unsmoked sheets (USS) and selling it together to a processor or a middleman. The number of members is on average somewhat below 100 and for the larger part of the co-operatives the number of members ranges between 40 and 120 (see Figure 5.1 below) and the number of members per cooperative varies substantially by province (see Figure 5.2 below). Around 10% of production of natural rubber, and a comparable share of are under rubber in Thailand originates from co-operatives (see also below). More extensive evidence of the characteristics of the cooperative sector is presented below and in the appendix to this section.

Figure 5.1 Distribution of co-operatives by size



Source: cooperative survey 2001, ORRAF/RRIT/ESI-VU

Typically these co-operatives have set up a processing factory with a grant, where member farmers would bring their fresh latex and the co-operative would process the fresh latex into ribbed smoked sheets (RSS). The cooperative would then sell the RSS on the auction market or to a trader. The farmer would get paid for his fresh latex. The price the farmer would get could be determined in a number of ways. The most common ways appear to be by adding a small mark-up on the local price of fresh latex, by deducting processing costs per kg from the current sales price of processed rubber

(RSS) or by using the nearby CRM price as reference price. The cost of producing RSS from fresh latex is on average 3.1 Baht/kg and varies from 2.7 to 3.8. Cost of producing RSS is on the high side in the province of Trang (3.8 Baht/kg). The cost of producing USS from fresh latex is on average 1.5 Baht/kg.

Farmers pay a membership fee and also pay to cover operating costs. In addition, they may buy shares in the co-operative. Part of the financial accounting and regulatory framework of these co-operatives is imposed by ORRAF when the co-operative is set up. Profit would then be distributed as:

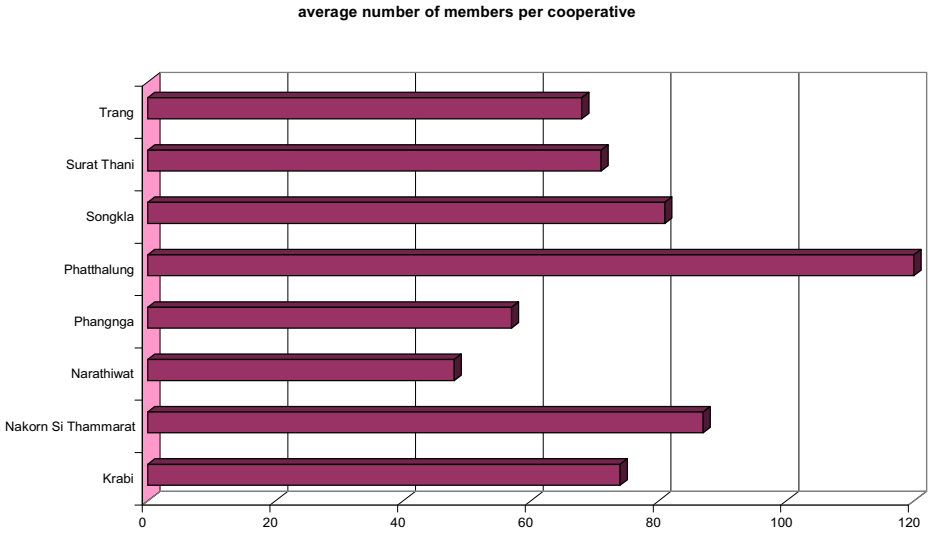
- payment of a percentage on shares in the capital of the co-operative
- payment of an amount based on production by the farmer
- payment for board members and administrative staff
- capital formation
- payment of 10,000 Baht to the apex organization of all co-operatives (not only rubber).

Membership of a co-operative includes the following benefits to farmers:

- a higher price for fresh latex: difference of about B 0.50/kg
- more reliable measurement of dry rubber content (no cheating by middlemen)
- a share of the profit
- easy and cheap access to a variety of other services, like insurance (health, sick leave, funerals etc.), savings & lending facilities, supply of fertilizers, herbicides etc., loans from BAAC at preferential rates.

In addition, farmers may have easier access to the intervention program. There is a special section on the intervention program in this report – see Section 4.4. Co-operatives have the potential to act as intermediaries for price insurance.

Figure 5.2 Members per co-operative by province



Source: cooperative survey 2001, ORRAF/RRIT/ESI-VU

In this section we also have summarized a number of results of a survey among co-operatives (see Appendix 5.1 for the tables with the results discussed below). The primary focus of the survey is to explain in what way willingness to pay for markets based price insurance is related to characteristics of the co-operatives. The questionnaire for the survey is drawn up by the ESI-VU (see Appendix B for the questionnaire). The survey has been fielded and computerized by staff of ORRAF and RRIT in the months March, April and May 2001. The survey under co-operatives generated a response of 506 out of a total of 685 co-operatives (73.9%).

If we consider **totals of the cooperative sector (province totals and country-wide totals)** we observe that total area of members of co-operatives is 9% of total area under rubber in Thailand. The importance of co-operatives, however, varies by province. In some provinces the area under rubber of members of co-operatives is around 20% of all area under rubber in the province (Chon Buri, Phatthalung, Ranong and Trad); in the province of Karn Chanaburi almost all area under rubber belongs to members of a cooperative. The total number of members of co-operatives as a share of the (approximate) total number of rubber farmers in Thailand is 3.9%. With a 9% share of area of members of co-operatives in total area under rubber in Thailand, this suggests that members of co-operatives are, on average, not the smallest farmers in terms of land. Within the survey both area of co-operatives and number of co-operatives are concentrated in a relatively small number of provinces, mainly in the south: more than 50% of the co-operatives and the area under rubber of members of co-operatives originates from Nkorn Si Thammarat, Phattalung, Songkla, Surat Thani and Trang. The number of co-operatives in the north east is small, and their share of area and sales in the co-operatives' total is marginal.

Looking at **averages per cooperative** the survey results reveal that the average number of members per cooperative: 85. For the larger part of the co-operatives the number of members ranges between 40 and 120. Further it is observed that the average area per cooperative is 2187 rai or 350 ha.

With respect to average area, production and yield of **individual cooperative members** (and by province) it is observed that the average area of a cooperative member is 34.6 rai or 5.5 ha, and province averages range from 16.4 rai / 2.6 ha (Buriram) to 75.7 rai / 12.1 ha. (Trad). These averages are substantially higher compared to the average area under rubber of small holders in Thailand, which is 13 rai. Average production of a cooperative member is 44.7 kg per day, and province averages range from 5.1 kg (Chantaburi) to 58.2 kg (Trad).

Farmers who are currently selling their production at intervention prices will most likely have a strong interest in price insurance if the price intervention scheme is substituted with some form of market based price insurance. In order to obtain a clearer idea on the role of co-operatives in the price intervention scheme, and to what extent members of co-operatives, or co-operatives themselves qualify for selling their rubber at intervention prices, we elaborate slightly on these issues below (see also Section 4.4). The actual buying of natural rubber at intervention prices by the

government takes place at local intervention points. Practically the purchases of rubber from local farmers are implemented by 259 local intervention points (the three central rubber markets, rubber processing co-operatives and ORRAF district offices). Under the scheme, only small sized farmers, defined as having an area of no more than 50 rai (8ha.), or a production not more than 100 kg fresh latex per day, are allowed to sell their production to the intervention authority. These smallholders are registered at ORRAF as small farmers. Data on the number and area of farmers & co-operatives registered at intervention points and by province (not from our survey), reveal that the share of rubber area **of registered farmers** varies widely by province, from close to 0 (e.g. Satun, Yala) to almost 50% (Buriram). In Surat Thani, Buriram and Nakhonpanom between 40 and 50% of total rubber area is cultivated by registered farmers, while this is in the range 20-25% for the province Nakorn Si Thammarat and Prajoub Kiri Khan. In terms of absolute numbers the provinces Surat Thani and Nakorn Si Thammarat clearly stand out. The share of rubber area **of registered co-operatives** is highest in Songkla, Surat Thani, Trang and Buriram.

The share of sales to the intervention authority may be considered a measure of dependence on the price intervention scheme. On the basis of the survey results it is inferred that, on average, 50.7% of the total sales of co-operatives is sold to the intervention authority. The distribution of the share of intervention sales is U shaped: many co-operatives have below 10% intervention sales, and many have above 90% intervention sales and relatively few cooperatives are in between. In Pang-nga and Trad the province average of this share of intervention sales is substantially below average. In Trang, Krabi, Chumporn, Surat Thani, Pattalung and Satun the province average of this share of intervention sales is clearly above average.

The presence of bank accounts may reflect regular financial transactions with a bank, possibly due to regular flows of income and perhaps saving, possibly due to credit arrangements with a bank. Because of the potential attractiveness of linking insurance to credit we are interested to know to what extent co-operatives and members of co-operatives have accounts at banks. Evidence from our survey, presented in Table 4 establishes that a large part of co-operatives have a bank account (76.9%), and 60.9% of all co-operatives have a bank account at BAAC, while only 19.2% of the members of co-operatives have a bank account.

Willingness to pay for market based insurance is investigated with the following question: *Are you (is your cooperative) interested to purchase market based price insurance for your processed output? Would your cooperative purchase such an insurance if the insured price is the current intervention price (NB: assume the intervention scheme does not exist anymore) and if you have to pay a premium of 0.5 baht, 1.0 baht, or 2.0 baht premium per kg processed rubber (dry weight)?*[11] The outcome of these investigations make clear that, on average, willingness to pay for market based insurance is 61.5%, and that province averages range from 38.2%

(Naratliwat) to 88.9% (Trad). Our reading of this evidence is that there is a strong interest in price insurance, which varies substantially by province. Willingness to pay appears to be strongly related to the presence of bank accounts at cooperatives, it appears not to be related to the presence of bank accounts of members, while relationships with other variables (e.g. average area or production of members, or sales revenues of the cooperative) are difficult to establish. From a multivariate analysis we learn that the presence of a bank account is significantly and positively related to the willingness to pay. Intervention sales are positively related to willingness to pay, and sharecropping is negatively related to willingness to pay.

The results of these investigations may be used to support the choice of the region, where the launching of a pilot scheme for insurance will be most effective, as the survey indicates a relatively high willingness to pay. Apart from observing willingness to pay directly, we may select provinces with a high penetration of bank accounts at co-operatives, a high share of intervention sales, a low share of share sharecroppers and high total sales. This appears to be the case in the provinces of Trang, Patthalung, Surat Thani, Nakorn Si Thammarat and Satun.

5.2 Smallholders' and cooperatives' requirements for and access to credit

The requirements for credit of smallholders may be split up into the long term requirements and short term requirements for credit.

Long term credit to natural rubber growers is mainly used for the purpose of re-planting and new planting. ORRAF currently (2001) provides a grant of 7,100 Baht per rai[12] for replanting natural rubber. This subsidy, which is paid as a mixture of cash and inputs, is a pure grant, and is available to all regardless of the farm size. However subsidies are limited (on a queuing system) in part because of limited funds and in part due to lack of fund partly due to a deliberate policy to limit the area under rubber, and to shift rubber production over time from the south to the northeast.[13] On application, ORRAF require evidence of ownership and ORRAF surveyor established the area qualifying for replanting aid. Re-planting is actively monitored by ORRAF staff. ORRAF inspections continue for a period of five years from replanting. ORRAF is financed by a levy through on rubber (0.90 Baht per kg in 2001).

Short term credit to smallholders is used for various purposes, ranging from purchasing fertilizer and buying tools to paying school-fees. Short-term credit to smallholders is provided by local banks. An increasing number of farmers is member

[11] We have taken together the willingness to pay against various premiums: it should be noted, however, that by far the largest share of co-operatives that is interested in the insurance, appeared to be interested only at the lowest premium of 0.5 baht per kg.
[12] One hectare is equivalent to 6.25 rai. The 1985 figure was 4800 Baht per rai.
[13] This policy, aimed at persuading southern rubber farmers to switch to oil palm, appears not to be very successful - although oil palm can be grown in the south (and not in the north) the infrastructural requirements are substantially larger than in the case of natural rubber (collecting oil palm nuts requires pick-up trucks and hence roads; a processing factory should be nearby and, as a result of these issues, the scale of production should be larger).

of a cooperative, which often also offers credit facilities. BAAC is the bank most widely used by rubber smallholders – see Section 5.3. BAAC is willing to lend smaller amounts than other banks (average loan size in 1999 was 100.000 Baht), and although borrowing involves bureaucratic processes, its lending conditions are often less restrictive than those imposed by other commercial banks. In particular, short-term loans from BAAC may be collateralized through joint guarantees by a group of other BAAC clients in addition or in place of more standard forms of collateral like land titles. Furthermore, interest on BAAC loans is payable annually rather than monthly and is likely to be at a lower rate of interest than that obtainable from other lenders.

5.3 BAAC: structure, role, lending and performance

The Bank for Agriculture and Agricultural Cooperatives (BAAC) has a central position in the provision of credit to farmers. BAAC started operating in 1966 to provide loans for Thai farmers with the objective of improving their access to credit. BAAC is state-owned and operates under the Ministry of Finance. It is widely regarded as an extremely well run government lender with a track record of strong loan performance. Historically, BAAC's loan recovery rate has been very high and administrative costs have been in the vicinity of 3% of total assets. Asset quality is occasionally aided by ad hoc government payments for natural disasters and interest rate concessions. However, BAAC's subsidy dependence index has been modest (though fluctuating with swings in inflation). In FY 1999 BAAC services reached farmers and farmer institutions in 877 districts and sub-districts in 76 provinces countrywide (excluding BAAC's Branch Offices in the Bangkok metropolis). In this year 72 provincial branches functioned as supervisors of district branches. There are 587 BAAC branches providing financial services to farmers and farmer institutions, including services to depositors. The branches are classified as 432 district branches, 71 mini-branches that are similar in status to district branches and 84 sub-branches that are under the supervision of district branches. In addition there were 887 district field offices that serve as the operating base for the Bank's field officers and as local points of contact for farmer clients. By the end of 1999 a total of 5 million farm families, or 88.54 percent of all farm families (according to the agricultural census of the National Statistical Office), had access to credit services from the Bank. Of this total, 3.50 million farm families were direct clients, 1.48 million were members of agricultural cooperatives and 0.02 million were members of farmer associations. The net rise of registered farmers during the year was 127,747 farm families, 2.26 percent above 1998. A large proportion of Thailand's roughly 1 million rubber farmers are clients of BAAC, making it an ideal vehicle for replication of a successful pilot program. (see Table 3.1 below).

Table 3.1 BAAC Delivery System Infrastructure (1996-1999)

	1996	1997	1998	1999
Province & District offices	535	667	586	587
Field offices	875	884	885	887
Total	1410	1551	1471	1474

Source: BAAC Annual Report 1999

The rubber sector has received loans between 5,000 to 7,000 million Baht per year from BAAC over the recent past. BAAC extends loans either directly to farmers or indirectly to farmer institutions such as agricultural cooperatives, which may later lend on to individual farmers. Loans provided by BAAC to individual farmers are either short-term loans, with maturity of not more than one year, medium-term with payment settlement between three and five years, and long-term loans with maturity of between five to fifteen years. Long-term loans are for investment in plantations and carrying a repayment period of between ten and fifteen years with an eight-year grace period to cover the periods in which trees are immature and cannot be tapped. BAAC also extends short-term loans for living expenses during periods in which they are unable to tap and loans used for diversification investment in cash crops and animal husbandry. The amount of these loans varies from 100,000 Baht to 15 million Baht (US$2,300 to US$330,000), the larger loans almost certainly going to cooperatives.

BAAC's high level of penetration (reported at about 80% of all loans to farm households) may have allowed it to exploit economies of scale in lending, but more importantly it allowed BAAC to compile and maintain detailed records on farmer credit status. This has almost certainly been a major factor in allowing BAAC to achieve a high level of financial performance.

The interest charged to farmers varies depending on the risks involved and the credit status of the borrower, as revealed by performance on BAAC's previous loans. The lowest risk borrowers are those who made payments without any interruption for a period of three or more years. The second category are those pay without interruption for two years and the third are those pay without interruption for one year. The final category is new borrowers, who will be charged the highest interest rates which can be as much as three percentage points above that charged to the best borrowers.

Standard BAAC loans to farmers are against collateral, typically in the form of title to land. However, these only amount to 30% of BAAC's rubber sector loan portfolio. The remaining 70% are so-called group loans. Although made to individual farmers, these loans are jointly guaranteed by groups of farmers who are typically situated close together in land reform areas and who lack title to the land they farm. No collateral is required (little would be available) but a loan to a member requires the rest of the group members to act as guarantors.

Historically, BAAC's loan recovery rate has been very high with the bulk of overdue payments received within two years of the commencement of arrears. In that context, the current debt moratorium proposals are a serious cause for concern. Repayment can

start as soon as the farmers earn revenues. Repayment installments can be monthly or annual depending on the condition and type of the loan. In some cases, the government is willing to pay interest on the farmers' behalf, e.g. when they faced natural disaster. BAAC may impose a surcharge (usually 3% per annum) for delayed payments. In more extreme cases, BAAC will consider restructuring of the client's debt.

5.4 Suitability and willingness of BAAC to provide price insurance

In our view, BAAC is the obvious candidate to act as retail LTM for the proposed rubber price insurance scheme. This judgment derives from

- their agricultural development mission;
- their extensive rural branch network and high penetration of the rubber smallholder sector;
- their detailed knowledge of farmer credit status;
- the low level of their administrative costs; and
- what, at least until recently, has been a good performance record.

No commercial banks can compete with BAAC in any of these respects.

BAAC has participated actively on a partner basis in our mission and has expressed unqualified enthusiasm for the proposed scheme. They are anxious to move to a pilot transaction as rapidly as possible, and thereafter, if the pilot transaction is successful, to extend the scheme to other commodities (specifically maize, rice and sugar). Other commercial banks have expressed positive views about the proposed scheme but concede that BAAC is best placed to implement it.

5.5 Availability of price insurance at the wholesale level

We held discussions with four international banks in relation to their ability to provide wholesale risk management instruments in natural rubber. These comprised three large international banks (A,B,C in what follows) and one specialized agricultural bank (D). Banks A, B and C maintain active Treasury departments which trade exchange and OTC derivatives. By international standard, these departments are small with relatively junior staff. Vacant trading desks were apparent on trading floors, confirming the impression of a decline in activity in derivatives since the Asian Crisis. For the most part, activity has become concentrated in interest rate, foreign exchange and energy derivatives. Interest rate and foreign exchange swaps are the most frequently traded products.

Banks B and C reported that they had traded agricultural derivatives in the past, but that there was little current demand for these products. When pressed about potential interest in providing such instruments, bank A indicated that this activity would be unlikely to form part of its Thai strategy, bank B expressed interest, but the seniority of the staff involved failed to inspire confidence in that opinion, while bank C, whose staff were both more senior and more knowledgeable about the commodity industries,

expressed serious interest. Our belief is that a more extensive survey would indicate that while commodity risk management is unlikely to be a mainstream activity of international banks in Thailand, a small number of these banks will be prepared to provide these services.

The fourth bank we met specializes in lending to the agribusiness sector throughout the world. They maintain a relatively small office in Bangkok but this is staffed with experienced personnel. They do not compete with the other international banks on the mainstream financial products but have cultivated a profitable niche activity in providing facilities for Thai agricultural processors and exporters. This bank expressed very strong interest in the ITF proposal, and indicated that they would expect to be able to offer both more flexible products and more favorable terms than would other banks.

At the same time, both banks C and D stated that they would require further information before they could state categorically that they would be able to tender to be the wholesale provider, and at what price they could provide the required instruments. This additional information relates in part to how the scheme would operate (likely volumes etc.) and in part to research they themselves would need to do on the feasibility and cost of taking offsetting positions. They would envisage doing this work if the scheme moves to a pilot stage. These issues are discussed further in Section 6.2.

Chapter 6 The Proposal

6.1 Proposed Transaction Structure

The proposed transaction structure is illustrated in Box 1. Institutions, individuals and organizations are referred to in rectangular boxed, while elliptical boxed denote activities. The two core institutions are the wholesale intermediary, an international bank, and the retail bank, which acts as the LTM. We propose that BAAC should be the retail intermediary. The top two-third of the box illustrates the wholesale transaction, discussed in Sections 6.2 and 6.3, and the bottom third illustrates the retail transaction, which we discuss in Section 6.4 – 6.6.

6.2 The Wholesale Transaction

The proposed wholesale transaction (see the top two-third of Box 1) is simple, at least in principle - the wholesale intermediary writes and sells OTC put options to BAAC. We anticipate that this transaction will take place periodically, for example at the end of each month, in order to generate a relatively large transaction size and to keep the wholesale intermediary's costs down. It is possible that there would be more than one wholesale intermediary, but for simplicity we assume a single bank performs this role.

The box shows the two ways that the international bank can offset the rubber price risk taken by writing puts to the retail intermediary. The two possibilities are to delta hedge the position on a rubber futures exchange (i.e. sell rubber futures contracts to offset the price exposure on the OTC puts), or to swap it out with a large rubber consumer, which in practice implies one of the major tire manufacturers. In a swap transaction of this sort, the tire manufacturer would itself write puts to the wholesale intermediary in the expectation of purchasing rubber at a price which will in average be cheaper but which would involve a payment to the intermediary (and so indirectly to farmers) at times in which prices are low. A swap transaction of this sort has the potential to be cheaper than the futures route because

- larger transaction size will reduce overhead costs;
- the intermediary will be able to offset its volatility (vega) risk as well as its price (delta) risk; and
- it may be possible, if desired, to extend the insurance over longer periods without incurring roll costs.

Whether and to what extent the selected wholesale intermediary will choose to offset its risk position in this way will depend on the suitability and liquidity of the rubber futures markets (including the eventual liquidity of any Bangkok rubber futures market) and whether and to what extent it has relationships with tire manufacturers. In Section 5.5 we indicated that two banks, referred to as C and D, expressed strong potential interest in the scheme. Both indicated to us that given current liquidity and basis risk in rubber futures markets, they would aim to offset at least part of their position (bank

C) or much of their position (bank D) with one or more major tire manufacturers. Bank C stated that they had recently discussed a similar type of transaction with one of the three major tire manufacturers, but, in the end, this had not resulted in a transaction. Bank D stated that they had no recent history of business of this sort with rubber consumers and they would need to talk to potential counter-parties before they could give a serious indication of the likely cost of the scheme. There was agreement in particular that formulaic estimates of the likely cost of price insurance (e.g. using the Black version of the Black-Scholes formula which is normally used in pricing options on commodity futures) might be quite misleading because of difficulties in price and volatility exposure in illiquid markets. Both banks stressed that an increase in liquidity in the existing rubber futures markets, or in a new market, would be very helpful.

6.3 The Offsetting Transaction

If the wholesale bank's risk position is to be offset through a major rubber consuming country, the offsetting contracts will need to be made attractive to this company. There are two possible ways that this can be done. The first is that the company can benefit from the premium income from writing puts. The second is that the transaction would take the form of a collar in which the tire company writes a put on the rubber price, which is intermediated through to the rubber farmers, but this is paid for by a call. The wholesale banks to which we talked indicated that, in their view, tire companies would be much more attracted by the collar structure than by the possibility of earning premium income. This is because the collar structure offers them the potential to cap their future raw material costs.

A collar structure has the superficial attraction to the farmers and cooperatives that it is apparently "free" at the time of purchase. However, in the event that prices do rise significantly, farmers face a price ceiling on their insured quantity and would lose much of the price rise, and at this point they are likely to be less enchanted with the scheme. This problem may be partially offset by the use of a "participatory collar" structure in which the call is written on only (say) half of the insured quantity. For a price above the ceiling, farmers would now benefit by 0.50 Baht/kg for every 1.00 Baht/kg rise in the price. The cost of this easing is that the ceiling would need to be lower in order that the value of the calls written by the farmers should offset the value of the put sold to the farmers.

A further disadvantage of the collar structure is that it raises performance issues at the retail level. High rubber prices would create a liability of farmers and cooperatives at the retail provider, BAAC, and BAAC would be obliged to seek payment of these debts. This may be difficult if the liabilities are considered as unfair, a possibility if the scheme is not clearly understood by all concerned at its outset. The collar structure would also imply that the wholesale bank would need to concern itself with BAAC's likely performance, while if the transaction were simply purchase of put options, no performance issues would arise.

It is our view that, at the retail level, the proposed scheme is likely to be much more attractive to farmers, cooperatives and BAAC if it is provided on a premium basis rather than on a collar basis. The practical problem, which we failed to anticipate, is that at the wholesale level, tire companies who are the natural intermediaries, would appear to prefer the collar structure. Unfortunately, we were unable to contact officials of any of the major tire companies at a sufficiently high level to discuss these issues.

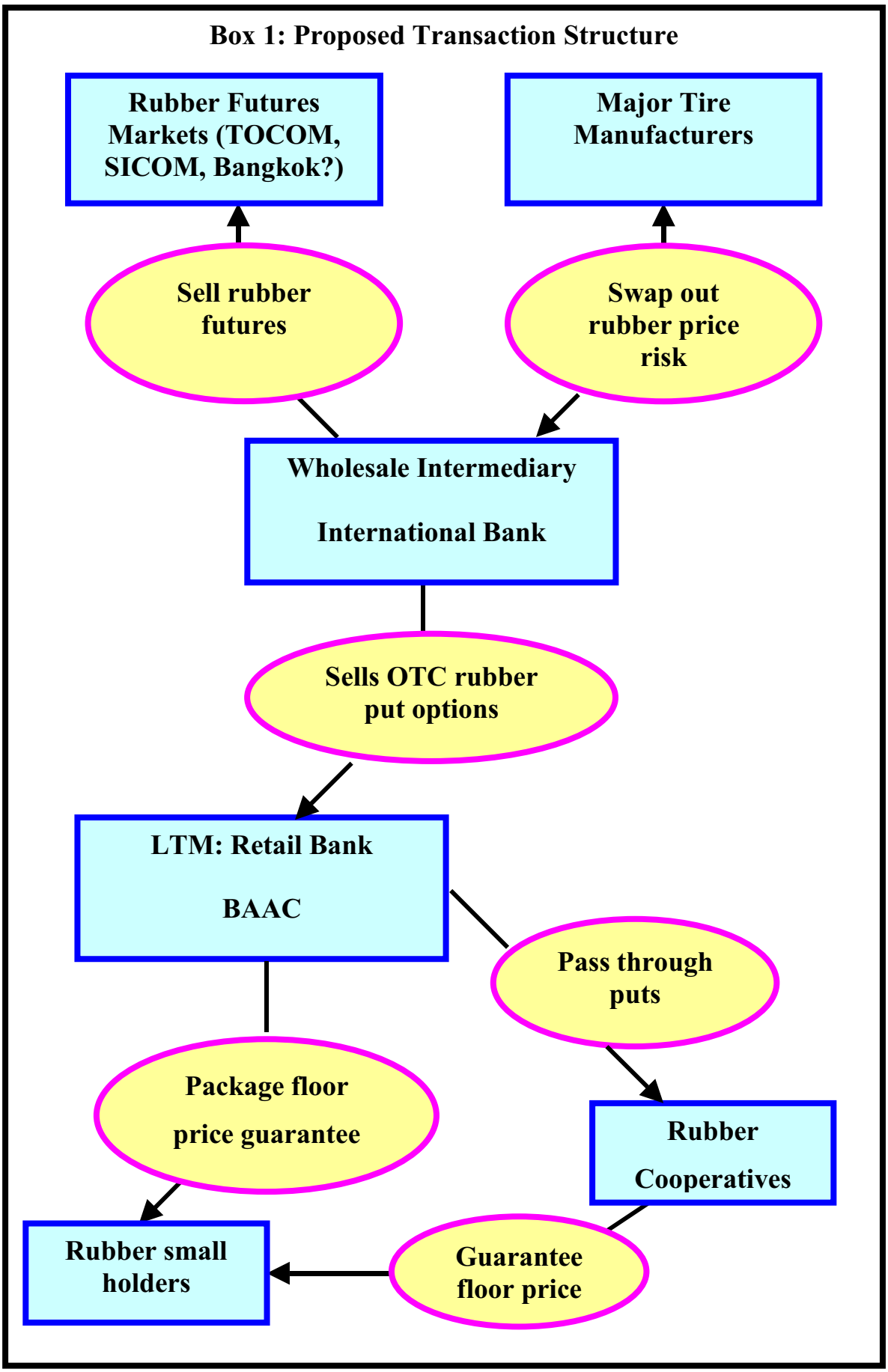
6.4 Choice of Wholesale Intermediary

We discussed the availability of price insurance at the wholesale level in Section 5.5, where we noted that at least two international banks have expressed strong interest as acting as providers. It is likely that if we introduced the proposal to other international banks, we would obtain further expressions of interest. Choice of a particular provider would necessarily depend on the precise specification of services to be provided, and on the price which the bank would require for these services. Lacking a precise product specification, we have not raised issues of price.

If this proposal moves to an implementation stage, BAAC, as retail provider will need to open discussions with the various potential wholesale providers to seek the most attractive quotation. They may choose to do this with ITF or World Bank assistance. But in any case, it would be wrong for us to attempt to prejudge the outcome of these negotiations.

It does seem likely to us that both the absolute and relative size of premium sought by different banks will depend on whether or not there is a liquid Baht rubber futures market in Bangkok. The current absence of a Bangkok market makes it more likely that a bank with established business in the agricultural swaps market will be best able to offset its risk, and hence charge a lower price. The ability of banks to offset risk on a Bangkok futures exchange would redress the balance towards banks with more general expertise in Treasury functions. We note that the Bangkok agricultural futures market is unlikely to become active prior to an early pilot implementation of the proposed insurance scheme, and this may limit willingness of banks to act as wholesale provider at this stage.

Box 1: Proposed Transaction Structure



6.5 Choice and Availability of the LTM

The choice and functioning of the Local Transmission Mechanism (LTM) is central to the operation of the price insurance schemes envisaged by the ITF. [14] We may consider three general types of intermediating transaction:

1. transactions in which the price insurance is provided by the purchaser of the commodity;
2. transactions in which the price insurance is sold combined with another product or service (typically a loan), and
3. transactions whose sole purpose is to insure against price risk.

The first case arises if the LTM is the organization which purchases the commodity from the farmer. In natural rubber, this would be the local rubber processor, which may be either a cooperative or a private sector processor. In this design, the LTM offers to pay at least the specified floor price, but the price paid in other circumstances will be at a discount to the market price to account for the price of the insurance. The difficulty with this type of scheme is that, when prices are above the guaranteed floor level, farmers have an incentive to deliver to an alternative purchaser to avoid paying the (*ex post* valueless) insurance. For this reason, it is generally supposed that this design is only suited to commodities such as sugar and palm oil where the supply chain is constricted (at the sugar mill or oil processing plant) in such a way that farmers cannot easily renege to an alternative purchaser. It appears doubtful that these conditions apply in the Thai natural rubber industry (see also Section 3.3).

In the second case (packaged transactions), the LTM may be an agricultural bank (providing credit), an input company (e.g. selling fertilizer) or an extension service (selling seeds or new trees). In all cases, credit is likely to be involved – explicitly in the case of a bank, and implicitly if the input company or extension service makes its product available on deferred payment basis. In our proposed contract design, BAAC is the natural intermediary as supplier of credit to a high proportion of rubber smallholders. Borrowers may either be farmers or farmer cooperatives.

In this structure, the intermediary will hope that by packaging his loan with price insurance, he will obtain enhanced performance. This is because price insurance should increase the borrower's ability to repay in the event of lower prices. Note that in this case, the insurance improves performance while in the previous case it threatened poorer performance. This structure provides the intermediary with either the incentive to require that the farmer purchase price insurance as condition for receiving the loan, or to offer the loan or associated product on more favorable terms (e.g. by classifying the borrower as having a higher risk status). To the extent that the intermediary goes

[14] See International Task Force on Commodity Risk Management in Developing Countries, A Proposal for a Market-Based Solution, Washington DC, 1999, pp.10-12.

the former route, the farmer's willingness to pay for insurance is of diminished importance; to the extent that it takes the latter route, the price of the insurance will become less transparent.

The third situation is that in which the farmer or cooperative purchases insurance on a free-standing basis. An individual farmer may have difficulties in getting his production insured but a cooperative or a small processing unit may be in the position to purchase price insurance for its processed output. The benefit to cooperative or a processor is certainty of output prices and stabilization of his income. In the case of a cooperative the benefits of such an arrangement directly flow to the farmers who are members, and hence owners of the cooperative. In the case of independent private sector processors, decreased risk may eventually lead to higher prices and higher income for farmers as well.

6.6 Retail Transaction Structure

The bottom third of Box 1 illustrates the proposed retail transaction structure. Here again there are two routes. On the left hand side, BAAC packages floor price insurance with its loan guarantees. BAAC's incentive to do this is that the floor guarantees should ensure enhanced repayment performance. The insurance will have two effects:

- By insuring against a low price outcome, he may feel more confident in taking a loan or in borrowing a larger amount.
- The fact that the farmer is insured will make BAAC more confident that the loan will be repaid and that interest will be paid in a timely manner. This is turn will increase BAAC's willingness to lend.

BAAC will maintain responsibility for marketing the insurance. It is possible that they will decide to make this an entirely voluntary matter for the farmers. At the other extreme, they may require farmers, certain categories of farmer (e.g. farmers without good collateral), or farmers borrowing for certain categories of activity (e.g. inventory finance) to purchase insurance as a precondition for obtaining a loan. The intermediate possibility is that the voluntary decision by a farmer of whether or not to insure might affect his credit status, and therefore the interest rate BAAC will expect him to pay.

BAAC's intermediation should be inexpensive and non-manipulable. There are three reasons for this:

a) Because the price insurance is packaged with the loan agreement, there will be no requirement for separate application, and only minor additional administrative costs. We envisage that the process will be very much like the decision to purchase accident insurance in an auto hire agreement, in which the client typically initials two boxes and signs a third box on the standard automobile hire form.
b) In the event of a claim, BAAC will be liable to pay only on the insured quantity, and not on the farmer's production or sales. BAAC will have no requirement to monitor actual production or sales, and the farmer will have no incentive to claim exaggerated losses.

c) We propose that the insurance should be written on a monthly average of the closest of the three CRM prices. CRM prices have official status and are publicly disseminated and widely known. They form the reference prices for town merchants' prices which move closely with but at a discount to CRM prices. Averaging smoothes out short-term variability and reduces the chance that a purchaser might manipulate the price on a particular day. And as with quantities, BAAC has no requirement to monitor the prices actually achieved by any farmers – a successful insurance claim will rely only on the difference between the guarantee price and the average of the CRM price over the relevant period.

The alternative route, illustrated in the southeast corner of Box 1, is for BAAC to pass puts through to rubber cooperatives. Since Thai rubber cooperatives normally have retained profits, their relationship with BAAC is normally that of a lender and not a borrower. These transactions will therefore not normally be associated with BAAC lending. Instead, BAAC would simply repackage puts it has bought from the international bank into smaller units, and sell these on, on a back-to-back basis, to the cooperatives. The cooperatives would use these positions to be able to offer price floors to member farmers. Depending on the size of the premium, this may be attractive to cooperatives in competing for market share with private sector buyers.

The attraction of intermediation via cooperatives rather than directly to farmers is that the insurance becomes a free-standing rather than simply a credit-enhancement product. However, these two routes are complementary and not mutually exclusive, and we propose that both should be pursued. In addition, it is possible that, with experience in this activity, BAAC may find it attractive to compete with the cooperatives in marketing free-standing insurance products.

We have also considered a variant of the third proposal in which the price insurance is made available as a development of the current rubber intervention scheme. In this variant, the Rubber Estate Organization, which currently administers the intervention scheme, would become the local transmission mechanism. It would offer qualifying farmers price insurance at the current intervention price some months in advance and offset its position through the wholesale intermediary. It would match the quantities it insures to its available resources, so that farmers will be offered insurance on a proportion of their normal production. Qualifying farmers would sell their rubber in the normal way but, in the event that the CRM price is beneath the guaranteed floor, would be compensated by the REO on their insured quantities.

This proposal may be seen as an evolution of the current intervention scheme. It would have the following advantages:

a) Qualifying farmers would be guaranteed the intervention price on insured quantities in advance. In the current scheme, they only obtain the intervention price if the government is actively intervening.
b) The government would not be involved in purchasing, storing or selling rubber. These activities are all irrelevant to the objective of compensating poor farmers for low prices.

c) The government would know precisely what they were committed to pay in advance and could gear their intervention commitments to the available budget. The scheme would be much more transparent than the existing scheme. Over time, the government may choose to seek a contribution from farmers for price insurance.
d) Because farmers would only be insured on specific quantities, they would have no incentive to expand production to take advantage of the scheme. The scheme would operate as a pure transfer, whereas the current intervention scheme operates through a production subsidy.

We see this proposal a means of piloting risk rubber risk management in Thailand. It is complementary to the main variant of the risk management proposal, in which BAAC would be the LTM and which would be directed towards the 90% of rubber farmers who do not qualify for intervention.

6.7 BAAC's Risk Position

The proposed transaction is set up in such a way that BAAC should be able to pass through most of its risk to the wholesale intermediary. However, two elements of risk will remain and BAAC will need to take appropriate action either to control or offset these risk components.

The first risk that BAAC may bear relates to movements of the Baht-dollar exchange rate. Natural rubber is a dollar commodity, and it is almost certain that the wholesale intermediary would, at least in the first instance, write the OTC puts it will sell to BAAC in dollar terms. In using these instruments to offset the Baht price insurance it has written for farmers and cooperatives, BAAC will take on the currency risk. This can be offset by taking appropriate positions in the Baht-dollar forward market, and while this presents no difficulty, the relatively wide bid-ask spread (± 0.20 Baht) will add to the cost of the premium. It remains to be decided whether BAAC will undertake these transactions on its own book, or whether it would seek to have them packaged into the positions it purchases from the wholesale intermediary.

The second component of risk that BAAC would face is the processing basis risk – the risk associated with relative movements in the price of smoked rubber in Bangkok and the price of unsmoked rubber in the CRMs, most notably that in Hat Yai. This risk arises since OTC puts purchased by BAAC would relate to processed rubber prices, while farmers and cooperatives are primarily interested in unsmoked prices. BAAC would need to absorb this risk. We believe the risk to be relatively small, but it would be important that it is quantified, and that BAAC makes appropriate provisions against it.

6.8 Support for the Scheme among Farmers and Cooperatives

In order to assess the level of support for the proposed price insurance scheme, a survey covering all 685 Thai rubber cooperatives is undertaken. In addition, around 50 traders and small processors using facilities provided by Thai Rubber Association are

interviewed. The proposed questionnaire is attached as Appendix B. The survey is conducted on our behalf by ORRAF, whose agents visit each cooperative on a weekly basis and the results are processed by RRIT. With more funding, a more extensive survey among rubber smallholders would be most attractive and appropriate to do.

The survey results are reported in Section 5.1 and indicate a strong interest among cooperatives in purchasing price insurance, if the current intervention scheme is abolished. Cooperatives were asked to indicate their willingness to pay for price insurance, in which, for the sake of simplicity, the insured price was assumed to be equal to the current intervention price. Answers were probed at various levels of premiums ranging from 0.5 Baht/kg to 2.0 Baht/kg. Cooperatives appear willing to pay this premium, although this adds substantially to their per unit cost of production of around 3 Baht/kg in converting fresh latex into RSS). In most cases, cooperatives stated that they would absorb these additional costs since competition would prevent them from passing on the cost to their members.

6.9 Economic Preconditions for Success

The cost of the proposed price insurance scheme will depend on the levels of the guaranteed floor price in relation to the prevailing market price. In general terms, it will only make sense to offer insurance at an out-of-the-money floor price – i.e. at a price which is beneath the prevailing market price. It will be possible to do this at a premium which is likely to be attractive to farmers when market prices are relatively high, but much less easy when, as currently, prices are low. However, these are exactly the circumstances in which the insurance will be most attractive to farmers. They are also the circumstances in which rubber-consuming companies are likely to be keen to at least partially lock into low prices by negotiating price ceilings by granting collar structures.

This generates a conflict between farmers' requirements and the instruments that the market can most easily provide. We have already explored this issue in Section 6.3. It seems possible that, given the current liquidity levels in rubber futures markets, collar structures (including participatory collars) may be the only instrument on offer in sufficient quantities at low price levels. If this turns out to be the case, it is not clear to us whether we would be prepared to recommend implementation.

These difficulties would be much less serious if either SICOM rubber futures liquidity increases, or if a liquid Bangkok futures market comes into existence. However, even then it would remain true that the price of worthwhile insurance during periods in which market prices are low could be prohibitive. This would pose a dilemma for those interested in providing such insurance. If, for example, the GoT were to see the proposed insurance scheme as a substitute for the current rubber intervention program, they might consider a subsidy to premium levels to make them affordable. The benefits of a subsidy program in these circumstances is that

- the budgetary cost would be strictly controlled,

- premium subsidies would not impose any costs on the domestic processing industry (the premium subsidies would not affect rubber prices),
- since the scheme would support farm incomes, not farm prices, it should not have any major effect either on Thai production levels[15] or, through production, on the world price, and
- it would not generate any deadweight loss in efficiency.

At the same time, the GoT might regard the budgetary cost of premium subsidies as prohibitively expensive. However since, in expectational terms, the costs of any other method of providing floor price support, would not be less and would generally be more than the costs of subsidizing put option premia,[16] this should imply that there is no better method of providing this support.

The fundamental point here is that market-based price insurance does not do the same job as a floor price guarantee. This is because market-based insurance insures farmers against the consequences of a *fall* in price to a level beneath the guarantee price, while a guarantee scheme insures farmers against price *levels* beneath the guaranteed price. The two schemes are the same so long as the price remains above the guarantee level, but once the price has actually fallen, it becomes very costly to insure against continuation of the low prices. Market-based schemes are potentially available against falls in a price, but if a government wishes to have an absolute floor price, it will need to devote significant resources to doing this.

The practical implication of these remarks is that, unless financial support from the GoT is forthcoming, it may only be possible to provide the desired levels of price insurance at affordable prices when market conditions are reasonably strong. This has implications for the timing of any pilot project. But it should also be noted that the same difficulties will arise in ITF schemes with other commodities in other countries.

6.10 Political Preconditions for Success

Three major factors will determine the success of the proposed scheme:

a) A new Thai government has been in the process of formation over the period of our mission. The government's agricultural policy is unclear at the time of writing. The proposed retail intermediary, BAAC, is a state bank, and although management is committed to and enthusiastic about the proposed scheme, BAAC's participation will depend on the new government's policy. We should add that we have no reason to doubt that they will consider these proposals on their merits – we state this precondition only because, at the present time, no-one has been able to clarify the likely direction of policy.
b) One of the attractions of the proposed price insurance scheme is that it could replace the current costly and inefficient rubber intervention scheme. The new Thai

[15] There will not be any price effect. However there may be an income and risk aversion effects.
[16] This follows from the fact that subsidizing an option premium does not generate any inefficiencies.

government has yet to form a view about rubber intervention. However, any continuation of active intervention would reduce the attraction to farmers of purchasing insurance. We would not propose moving to a pilot implementation while acting intervention is taking place.

c) The debt moratorium suggested by what is now the leading government coalition party during the recent election campaign potentially threatens to undermine debt performance across the Thai banking system – see Section 5.3. This would be a particular worry if it were to undermine or even prejudice the solvency of BAAC. Recent evidence indicates that BAAC's loan recovery rate indeed has deteriorated significantly but not substantially over 2001 and that this deterioration is attributed to the debt moratorium. This position requires continued and careful monitoring over the period in which the GoT resolves its position on the possible debt moratorium.

d) We have emphasized that a liquid Baht futures market in natural rubber for Bangkok delivery has the potential to allow the wholesale provider to offset its risk position more easily. This should be reflected in reduced premium levels, and is also likely to increase potential competition for the wholesale function. In our view, liquid futures trading will require a specific relaxation of exchange controls. The Bank of Thailand is currently unwilling to speculate on the likelihood of such a relaxation. Our view is that the required relaxation is unlikely to take place unless there is concerted pressure from the Ministry of Commerce with strong political support, including active involvement of the rubber processors.

Chapter 7 Costs and Benefits

7.1 Costs of the Proposed Price Insurance Scheme

For rubber smallholders, the cost will be those premia they pay directly. Cooperatives could bear the costs of premia paid out of accumulated profit or through credit extended for that purpose. At this stage we are not able to quantify the likely premium size. We note that there is some evidence that smallholders appear willing to consider a premium of between 2% and 8% of the rubber price for put insurance at prices slightly below prevailing market prices. If the scheme is introduced in conjunction with an ending of rubber intervention, smallholders would lose the benefit of higher rubber prices.

Government will bear costs only to the extent that it subsidizes premia, or that it underwrites risk. However, the GoT may wish to invest a proportion of its agricultural extension funds into farmer education in conjunction with price insurance. The government may also have some set-up costs (education smallholders to get acquainted to the new price insurance). BAAC will incur a small level of additional administrative costs, and will also need to absorb the processing cost element of basis risk (the difference between unsmoked CRM prices in Hat Yai and RSS3 prices in Bangkok). We believe this risk will be small.

7.2 Benefits of the Proposed Price Insurance Scheme

The benefits to smallholders of the proposed scheme comprise

- enhanced credit (i.e. greater loan availability, possibility at lower interest rates);
- increased confidence in borrowing;
- the possibility of access to a guaranteed floor price for cooperative members;

If, as we hope, the scheme is introduced in connection with elimination or phasing out of the current rubber intervention program, government will benefit from an end of the current requirement to devote budgetary resources to intervention, and can hope for a degree of de-politicization of agricultural pricing issues. Rubber processors would benefit substantially from the ending of their implicit subsidy to the producers.

As retail intermediary, BAAC would hope to benefit from

a) a margin on the cost of purchase of insurance from the wholesale provider;
b) improved recovery on its loans to rubber farmers;
c) increased lending to the rubber sector as the result of greater confidence on the part of farmers.

7.3 Balance of Cost and Benefits

At this stage it would be premature to attempt a quantification of the balance of costs and benefits. The information required for this exercise will include

- an indication from the new GoT of their attitude to the current rubber support program;
- estimates from potential wholesale providers on the likely size of premium to be charged for price insurance;
- an estimate from BAAC of the likely margin they would require for intermediation;
- a provisional decision from BAAC on the likely level of insurance they would expect farmers to take up on BAAC loans at the specified premium levels;
- estimates from cooperatives on their likely demand for price insurance at the specified premium levels.

Note that for any specified floor price level, the premium required to insure this level will decline as the current price level rises. It seems quite plausible that the benefits of price insurance may outweigh the costs when prices are relatively high, but fall short of these costs when the price is perceived to be low – it is expensive to "insure" against a current affliction. The overall balance of costs and benefits will therefore depend on the prevailing price, and a long term assessment will require averaging over the likely price distribution.

7.4 Replicability

Geographical replicability

The current test case focused on natural rubber in Thailand, with an emphasis on southern Thailand where about 85% of the natural rubber is produced. It is easy to extend to the east and the north-east of Thailand where the institutional factors are not really different.

It is not straightforward to use the preliminary conclusions about the feasibility of this approach in Thailand as basis for the assumption that the same approach can be used for risk management on natural rubber in other countries. In some producing countries, most notably Vietnam, estates predominate and smallholders are responsible for a much lower proportion of rubber production. In Malaysia estates predominated in the 1970s with shares in total production of around 50% but at the turn of the century this share has decreased to levels of 20-25%. In addition, marketing infrastructure and institutional structures may be different. In particular, our proposal relies on BAAC to act as LTM, but BAAC is one of the strongest agricultural banks in the developing world which has a particularly high market share among smallholders. The choice of an agricultural bank as LTM is unlikely to generalize to many other rubber-producing countries.

Commodity replicability

From the experience during the current study, we are confident in asserting a high degree of c*ommodity replicability* in Thailand. The institutional factors which underlie our approach in rubber are also present in the Thai maize, rice, oil palm, coffee and sugar industries. In particular, BAAC operates in all these sectors. However, types and variety in processing, marketing structures availability of suitable futures contracts, points of constriction in the trade chain, size of price risks and current price support will all be different.

Economies of scale and scope

We believe there is a minimum scale to make the proposed structure for natural rubber feasible in economic and financial terms. However, beyond a certain minimum efficient scale, it is not likely that significant further economies of scale exist, although any further expansion may help reduce the cost.

Economies of scope may be more important. It is likely that addition of more commodities in the same system will help reduce the cost and increase the feasibility. This would especially be the case if the other crops would be grown in the same areas, and/or be served by the same bank. What may be interesting is the possibility that risk in one commodity may perhaps be offset by risk in other commodities. This could reduce the required insurance premia.

7.5 Further work

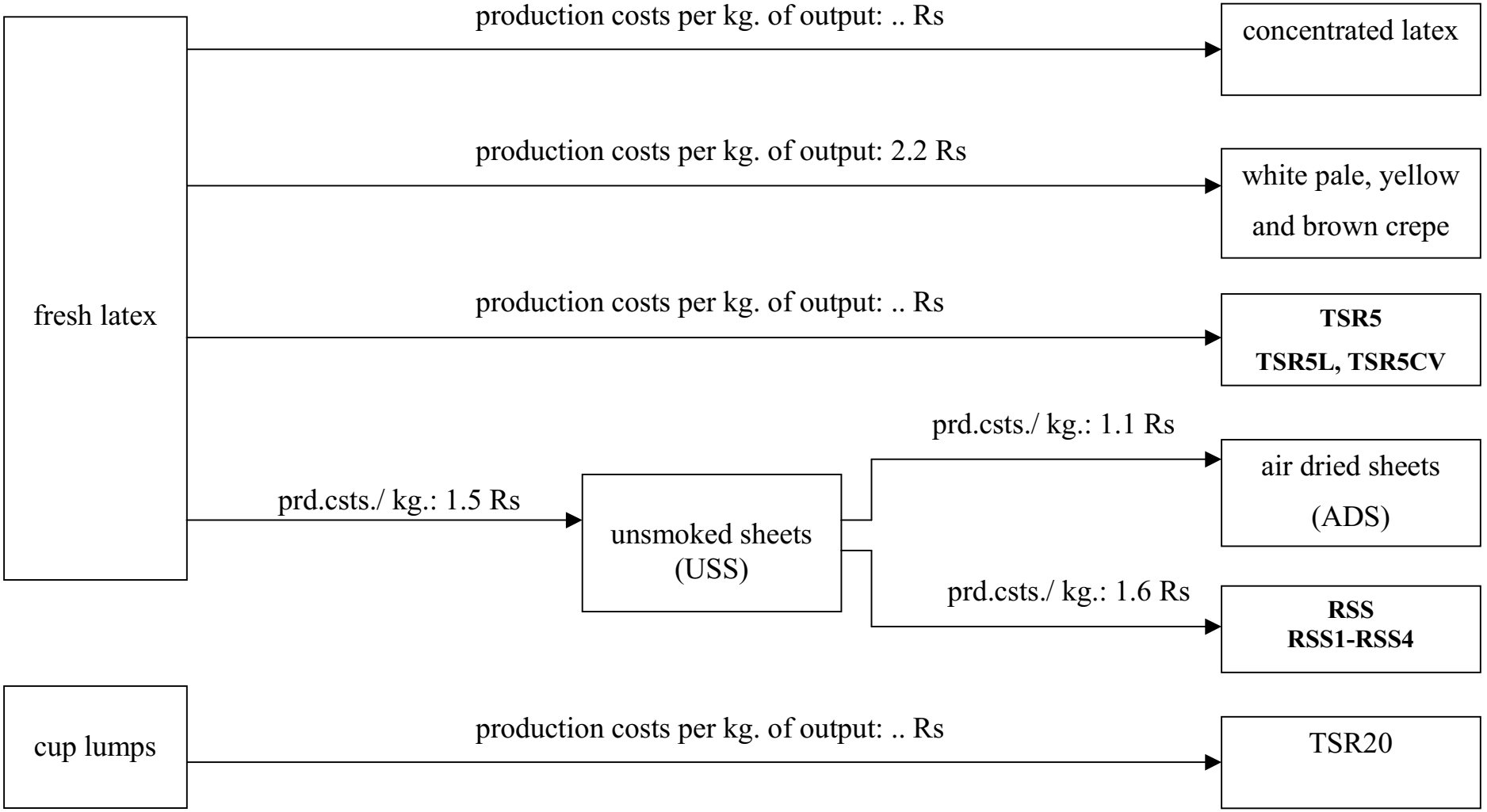
This draft preliminary report is the output of the project whose terms of reference are the proposal included as Appendix A. An end-of-mission workshop held in Hat Yai (Thailand) on 19 February 2001 brought together participants from all the rubber industry groups. Preliminary project results were discussed during the morning session. All present expressed enthusiasm for the initiative.

The afternoon session was devoted to 'Implementation' and was chaired by Dr. Wate Thainugul, Managing Director of the Thai Rubber Association. There was consensual agreement that the following steps should be taken:

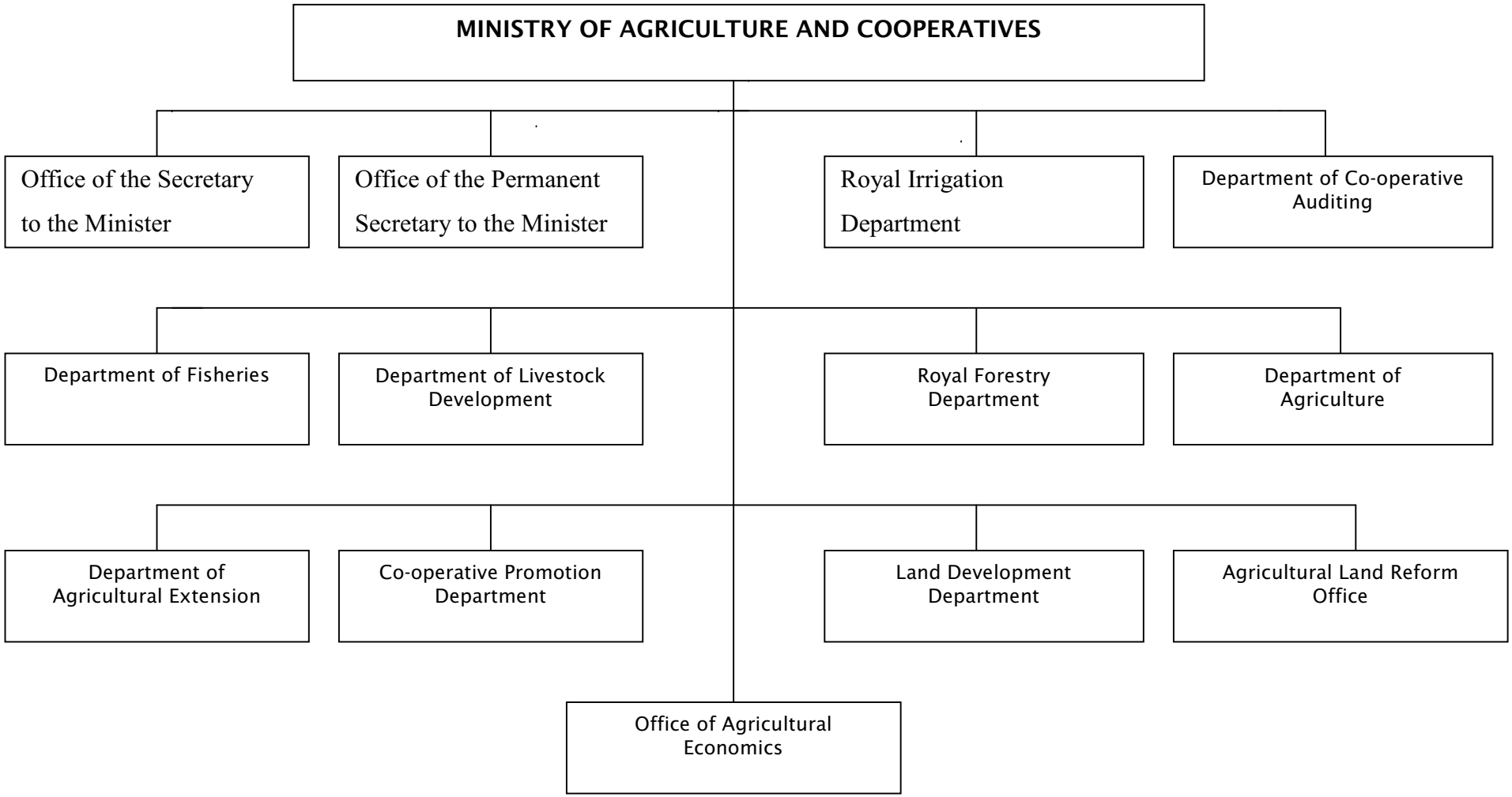
1. Completion of the report on the current project. The report should be sent to all parties involved.
2. Obtain the preliminary agreement of all parties involved to continue towards an implementation phase.
3. Organise as soon as possible a workshop with all parties involved to agree on the implementation of a pilot project. Implementation of a pilot program should be in the Hat Yai region of southern Thailand, and BAAC should be the LTM intermediary. Both co-operatives and unorganized smallholders should be in the project. The workshop should determine all parameters of the pilot project in conjunction with the ITF.
4. Seek consent from the GoT to start the pilot project

5. If the pilot project is successful, it should be an objective to move rapidly to full implementation.

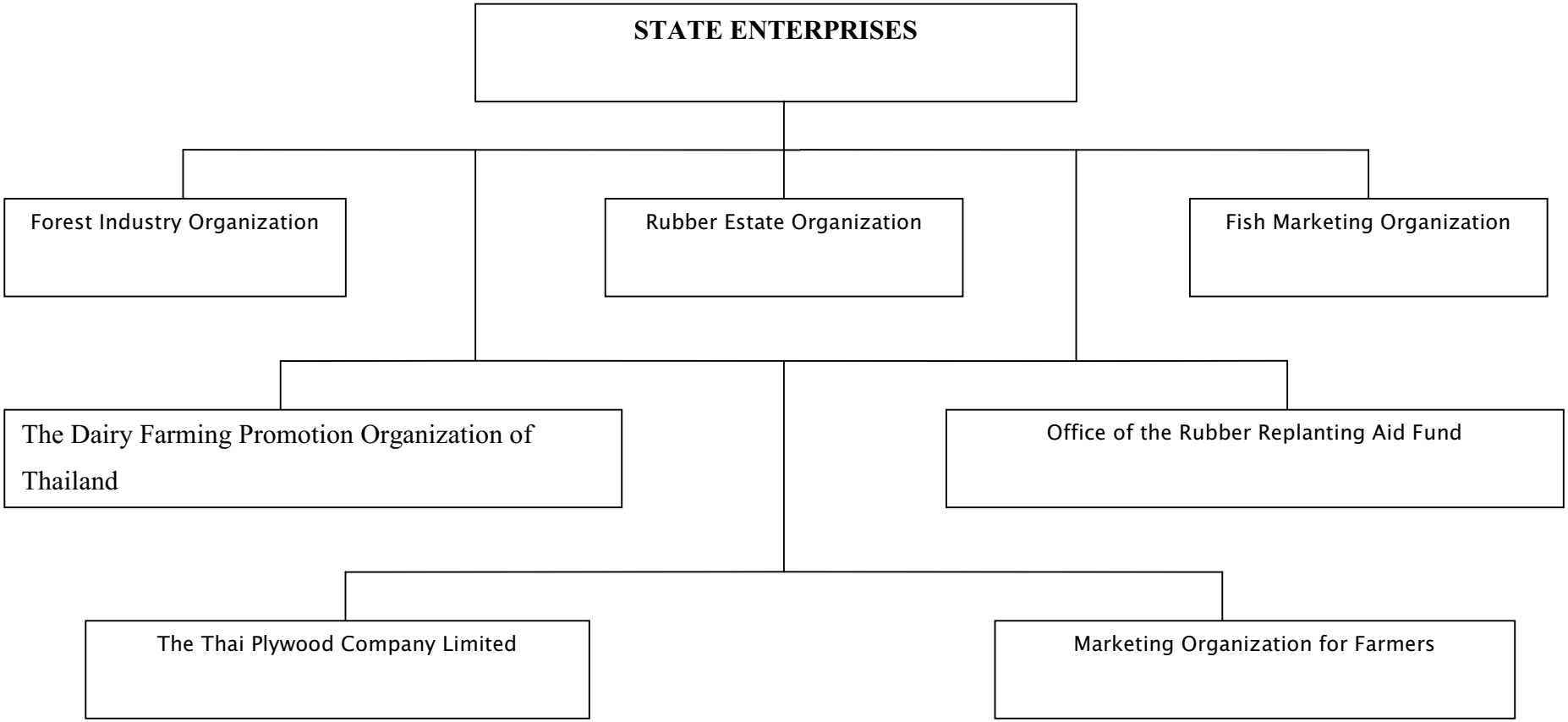
Appendix 3.3 From fresh latex to processed rubber



Appendix 3.4 Government organizations, ministries and state enterprises



Government organizations, ministries and state enterprises (continued)



Appendix 4.4 The Thai Rubber Intervention Scheme

In the absence of intervention, the domestic demand curve (given the world price) is *dd* and the (competitive) supply curve is *ss*. This gives market clearing at the price *p* with quantity *q* produced.

Intervention takes the form of offering a group of producers a price $p^* > p$. Suppose the fraction of producers eligible this price is *a* where $0<a<1$. We assume that the producers that obtain the intervention price produce under the same cost conditions as those who sell on the market. Figure 2 illustrates the position in the intervention market. Prior to intervention, this group of producers produced output $q_i' = aq$ where the subscript *i* indicates intervention. Benefiting from the intervention price, their output rises to q_i'. Initially, we make a small country assumption and suppose the government values its intervention purchases at the pre-intervention price *p*. In that case, the cost to the government of intervention is A+B+C. The area A+B corresponds to an increase in producer surplus, while C is a deadweight loss due to increased production costs.

Supply on the non-intervention market is reduced in the proportion 1-*a* for all prices less than the intervention price p^*. The non-intervention supply curve therefore becomes *s'ss* in Figure 3. The market clearing price rises to *p'* with a non-intervention quantity q_n' traded. Domestic processors, who purchase on the non-intervention market, lose surplus to the value of X+Y+Z. Of this, X is a transfer to producers while Y +Z is deadweight loss, Y due to increased production costs and Z to loss of consumption possibilities. The net loss to the economy is the sum of the three deadweight losses, C+Y+Z. In summary:

Gain to smallholders	- (A+B+X)
Budgetary cost to government	- (A+B+C)
Cost to domestic processors	- (X+Y+Z)
Deadweight loss	- (C+Y+Z)

We evaluate these losses below in Table 1. Deadweight losses are estimated as small, so the transfer benefits dominate – from government to farmers eligible for intervention sales and from domestic processors to farmers selling on the free market. The indirect benefits to farmers ineligible for intervention sales are of the same order of magnitude as the direct benefits to those selling through the intervention scheme. Note that, in this case, the deadweight loss is also the net loss to the economy. Details of the estimates used in the calculations are given at the foot of the document.

Table 1 Estimated Costs and Benefits of Rubber Intervention (m Baht) – Case 1

	1997	1998	1999	2000	Total
Benefit to intervention farmers	240	240	481	4	1101
Benefit to non-intervention farmers	170	170	277	256	1255
Cost to processors	-175	-175	-288	-256	-1279
Cost to government	-244	-244	-485	-4	-1115
Deadweight loss	-9	-9	-15	0	-38

Now drop the small country assumption. The additional production stimulated by intervention will reduce the world price, and this will result in the domestic demand curve shifting leftwards to *d'd'*. This reduces the size of both the transfer from processors to producers, and the deadweight losses in Figure 2 – see Figure 4. With regard to the non-intervention market, it increases the government's budgetary costs to A+B+C+D+E+F – see Figure 5. The additional loss D+E+F is a transfer to overseas processors and consumers.

Estimated values are in Table 2. Farmers not eligible for intervention are seen to gain relatively little. The overall loss to the economy is substantial.

Table 2 Estimated Costs and Benefits of Rubber Intervention (m Baht) – Case 2

	1997	1998	1999	2000	Total
Benefit to intervention farmers	235	364	441	2	1042
Benefit to non-intervention farmers	-4	182	0	132	310
Cost to processors	-175	-560	-288	-256	-1279
Cost to government	-244	-382	-485	-4	-1115
Deadweight loss	-9	-13	-14	0	-37
Net loss to economy	-188	-396	-332	-125	-1041

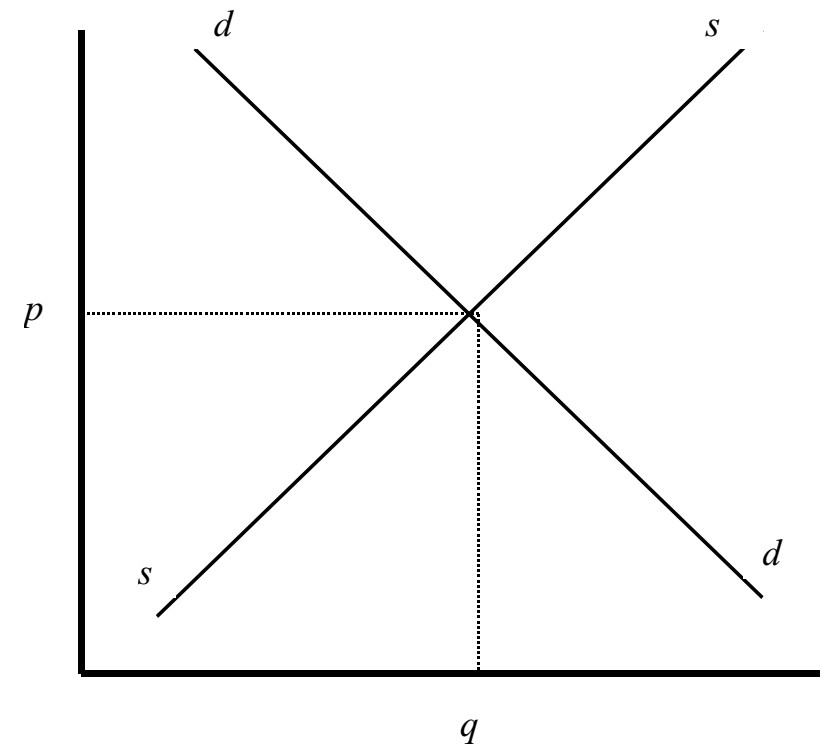


Figure 1 The Pre-Intervention Market

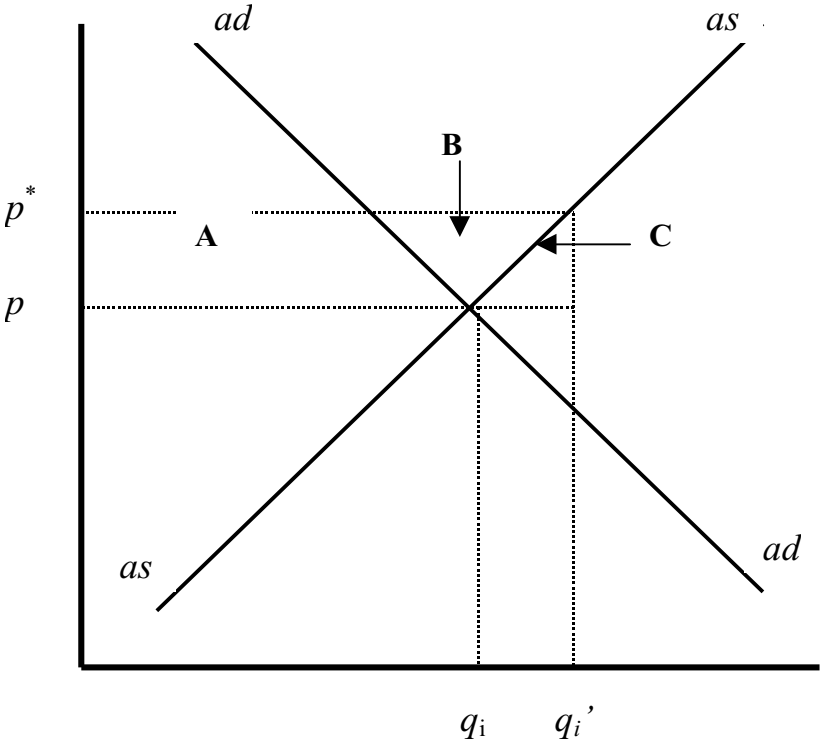


Figure 2 The Intervention Market

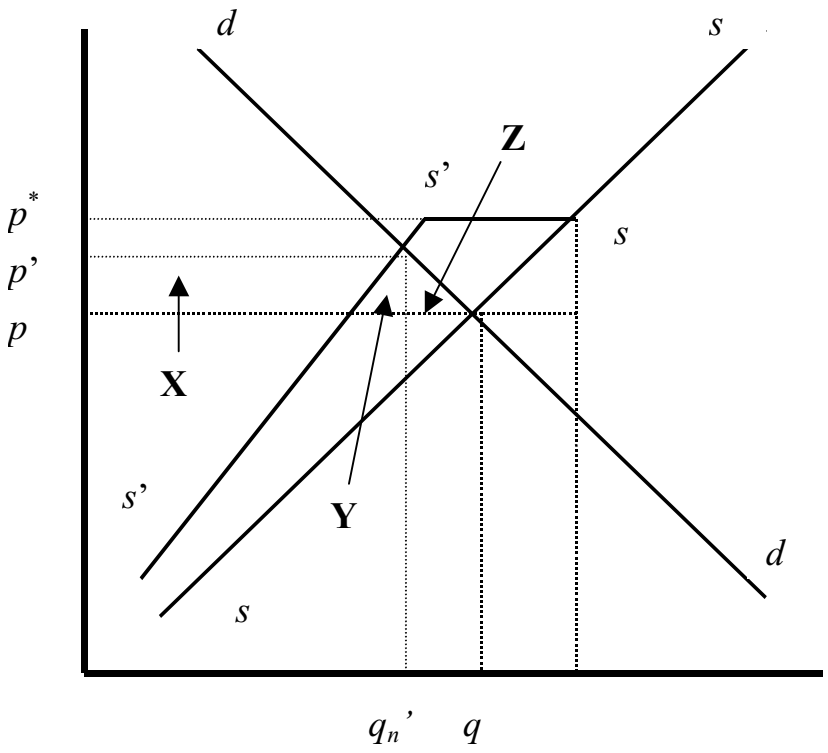


Figure 3 The Intervention Market

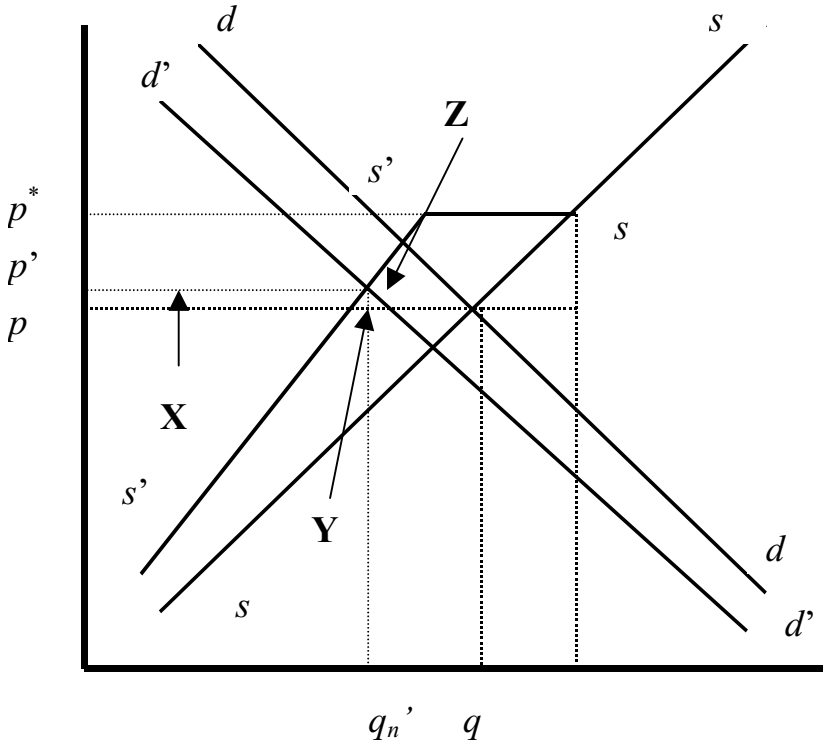


Figure 4 The Effects of a Fall in the World Price (Non-Intervention Market)

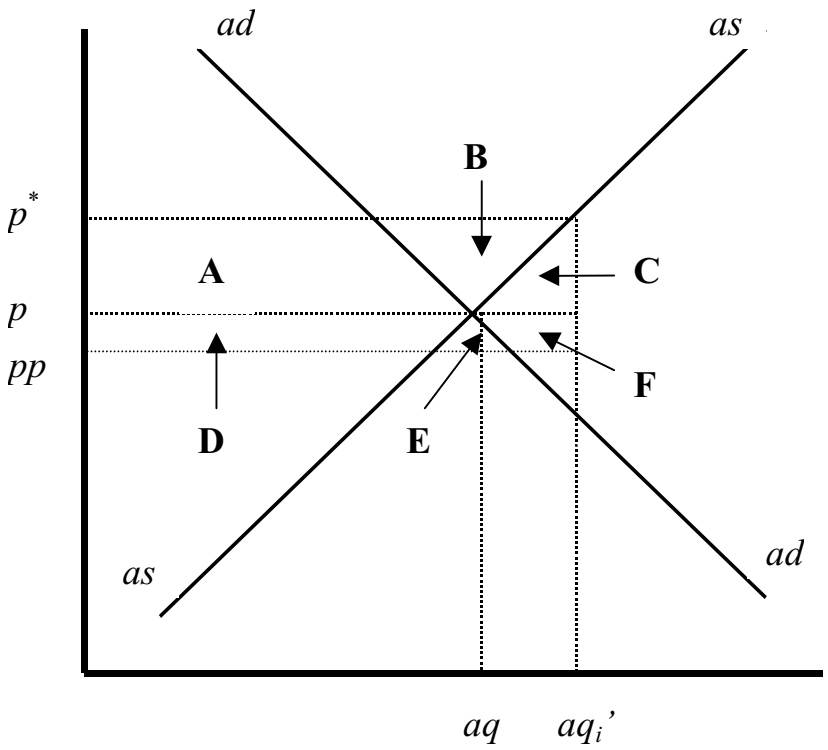


Figure 5 The Effects of a Fall in the World Price (Intervention Market)

Estimated equations:

The model consists of three equations and in imposed parameter. All equations are estimated using monthly data but with variable samples depending on data availability. The first equation relates the Bangkok price *PB* for smoked rubber to the SICOM price *PS*, converted into Baht, which we take as representing the world price. The equation has an error correction form. The effects of intervention are seen as coming through changes in the Thai intervention price P^* and the level of intervention purchases *INT* scaled by production *Q*. The estimated equation (*t* values in parentheses) is:

$$\Delta \ln PB_t = -\underset{(1.85)}{0.008} + \underset{(15.5)}{0.828}\Delta \ln PS_t - \underset{(5.03)}{0.577}\ln\left(\frac{PB_{t-1}}{PS_{t-1}}\right) + \underset{(2.14)}{0.214}\Delta \ln P_t^* + \underset{(2.03)}{0.122}\frac{INT_t}{Q_t}$$

The second equation relates the Bangkok smoked rubber price to the Hat Yai unsmoked price *PH*, which is the price we take as being received by smallholders. This equation also has an error correction form.

$$\Delta \ln PH_t = -\underset{(3.31)}{0.075} + \underset{(19.4)}{1.304}\Delta \ln PB_t - \underset{(3.45)}{0.340}\ln\left(\frac{PH_{t-1}}{PS_{t-1}}\right)$$

The third equation links production seasonally adjusted *QA* to the Hat Yai price *PH* and to the intervention level:

$$\ln QA_t = \underset{(38.6)}{4.131} + \underset{(13.8)}{0.0040}TREND_t + \underset{(3.31)}{0.120}\ln PH_{t-2} + \underset{(2.13)}{0.420}\frac{INT_t}{Q_t}$$

Note that every ten tons of rubber purchased under intervention is seen as stimulating an additional four tons additional production. The model uses an imposed flexibility of -0.33 for converting increases in Thai production to falls in the SICOM price.

Appendix 4.7 Exchange Control Regulations

In literature distributed to the public, the BoT states

"Foreign investments in Thailand, both direct and portfolio investments are freely permitted. Nonresidents may lend in foreign currency to residents without restriction. Both capital and loans can be freely transferred into the country and must be surrendered to an authorized bank or deposited in a foreign currency account with an authorized bank in Thailand within 7 days. Foreign investments in Thailand with promotional privileges from the Board of Investment are accorded various incentives and special benefits. Repatriation of investment funds and repayment of overseas borrowing in foreign currency can be remitted freely upon submitted of supporting evidences. Securities, promissory notes, and bills of exchange may be sent abroad without restrictions."

"Direct foreign investments by Thai residents or lending to their affiliated companies abroad not exceeding US$10 million yearly do not require authorization. The remittances to Thai emigrants permanently residing abroad are allowed up to US$1 million per persons yearly provided that funds are derived from their own personal assets or inheritance. The remittance to relatives permanently residing outside Thailand are also allowed up to US$100,000 per person yearly. Any amount above this limit, permission must be obtained from the Bank of Thailand. Buying immovable assets or securities abroad also requires approval from the Bank of Thailand."

Appendix 4.8 TOCOM and SICOM Basis Risk for Thai Rubber in Hat Yai

In this appendix, we summarize calculations of the basis for unsmoked rubber in Hat Yai against the RSS3 contract on TOCOM in Tokyo and against the RSS3 contract on SICOM. Hat Yai is the most important local rubber market in Thailand. Rubber produced in the southern part of Thailand will be priced relative to the Hat Yai Central Rubber Market price. In our price insurance proposal, we suggest that the intermediary (BAAC) offers insurance relative to the Hat Yai price. SICOM and TOCOM appear the most appropriate futures exchanges to consider. TOCOM is currently the only liquid futures market for natural rubber. To the extent that the wholesale intermediary wishes to offset its positions on a rubber futures market, it would currently be likely to use either TOCOM or SICOM. As noted in the text, the TOCOM contract is denominated in yen and the SICOM contract is denominated in US dollar.

Thai rubber processors-exporters negotiate dollar-based forward contracts mainly with tire manufacturers and mainly in Japan. They buy cash unprocessed rubber in Hat Yai and other local markets. They hedge their short forward positions by taking long futures positions on TOCOM or SICOM. The quality of their hedging basis depends on the correlation of the Hat Yai, converted to dollars, and TOCOM and SICOM prices.

We are proposing a scheme in which Thai rubber smallholders obtain prices floors through a retail intermediary. These floors should relate to an average (monthly or quarterly) of Hat Yai prices. The intermediary will offset its exposure by long OTC (average price) put positions made available by an international bank. In turn, the bank will hedge their position on TOCOM or SICOM. Provided currency hedging is feasible, premia will depend on the correlation of the with the TOCOM and SICOM prices with the Hat Yai price converted into respectively yen and US dollars. If it is prohibitively expensive to hedge currency risk, the premia will depend on the correlation between the Hat Yai, expressed in Baht, and respectively the TOCOM prices, expressed in yen and SICOM prices, expressed in US dollars.

We have calculated basis risk for 30, 60 and 90 (working) day holding periods for Hat Yai rubber prices respectively in yen (only TOCOM), US dollars and Baht. The basis is calculated as the simple correlation between the holding returns of the prices in the respective currencies over the specified period. Hedge efficiency – or the extent to which a hedge can reduce risk - depends on the squared correlation coefficient. The effective sample is 19 May 1997 through 28 September 2000 (746 observations)[17]. The results are as follows:

	30 Day Holding Period		
	Baht	**US Dollars**	**Japanese Yen**
TOCOM	0.7131	0.7644	0.7952
SICOM	0.7091	0.8899	
	60 Day Holding Period		
	Baht	**US Dollars**	**Japanese Yen**
TOCOM	0.6170	0.7342	0.7812
SICOM	0.5130	0.8683	
	90 Day Holding Period		
	Baht	**US Dollars**	**Japanese Yen**
TOCOM	0.5003	0.7736	0.8027
SICOM	0.4016	0.8499	

If it is either not possible or too expensive to hedge out currency risk, the baht correlations are the most relevant. The SICOM basis equals the TOCOM basis at 30 days, but hedge quality is poor (50% risk reduction). In general one should expect basis risk to increase with the holding period and this is supported in the table: at 60 and 90 days, both exchanges offer poor hedge bases (25%-40% risk reduction). The limited size of risk in this situation suggests that hedging is not interesting if it is either not possible or too expensive to hedge out currency risk

If the (wholesale or retail) intermediary can easily hedge out currency risk, the relevant correlations are the dollar basis for SICOM and the yen basis for TOCOM. The SICOM dollar basis is reasonably good at 30 days (79% of risk eliminated), and slightly less good at 60 and 90 days (75% and 72% risk reduction). The TOCOM yen basis is less good (respectively 63%, 61% and 64% risk reduction).

Assuming sufficient liquidity, SICOM appears to offer the best hedging basis for a Thai price insurance intermediary but the intermediary would also need to hedge its dollar exchange rate exposure. A liquid Bangkok rubber futures market might give a superior hedging basis, but if it is costly to hedge baht-dollar risk, the Bangkok spread might be high making hedging expensive.

[17] The sample is short (there is an overlapping observations problem) and the sample may be contaminated by the effects of the Thai rubber support scheme. The results may therefore not be completely reliable, and it will be important to attempt to obtain a longer historical sample.

Appendix 5.1 Cooperatives and willingness to pay

Table 1 Cooperatives of natural rubber farmers in Thailand: size of cooperatives by members, area and sales revenues

Province		rubber area, 1996 (RRIT) /a 1000 rai	%	no.of coop #	col.s %	total area of coop /a 1000 rai	col.s %	avrg. area p.c. /a 1000rai	no.of memb #	col.s %	avrg.# of memb/ c #	total sales 1999-2000 1,000,000B	col.s %	avrg.sales pc 1,000,000B
Chumpon	s	318.7	2.6	16	3.2	47.4	4.3	3	1239	3	77	61.2	3.3	4.4
Krabi	s	622	5.1	28	5.5	68.2	6.2	2.4	2062	4.9	74	79.9	4.3	3.5
Nakorn Si Thammarat	s	1,406.10	11.5	87	17.2	146.2	13.2	1.7	7588	18.1	87	380	20.2	5.1
Narathiwat	s	890.1	7.3	34	6.7	36.5	3.3	1.1	1636	3.9	48	58.4	3.1	2.2
Pattani	s	271.2	2.2	18	3.6	14	1.3	0.8	1136	2.7	63	35.6	1.9	2.1
Phangnga	s	617.8	5	22	4.3	65.2	5.9	3	1248	3	57	41.3	2.2	3.8
Phatthalung	s	513.4	4.2	48	9.5	102	9.2	2.1	5772	13.8	120	243	12.9	5.2
Phuket	s	108.3	0.9	4	0.8	4.8	0.4	1.2	676	1.6	169	40.2	2.1	
Ranong	s	79.9	0.7	4	0.8	20.5	1.8	5.1	603	1.4	151	11.5	0.6	5.8
Satun	s	281.3	2.3	13	2.6	34.3	3.1	2.6	1530	3.7	118	73.4	3.9	5.6
Songkla	s	1,650.20	13.5	88	17.4	151.8	13.7	1.7	7148	17.1	81	454	24.1	6.1
Surat Thani	s	1,662.60	13.6	34	6.7	127.2	11.5	3.7	2406	5.7	71	91.2	4.9	4.1
Trang	s	1,059.30	8.7	65	12.8	119.8	10.8	1.8	4388	10.5	68	184	9.8	3.2
Yala	s	945.1	7.7	14	2.8	44.5	4	3.2	1158	2.8	83	48.9	2.6	3.5
Chachongsar	e	16.6	0.1											
Chantaburi	e	527.6	4.3	1	0.2	5.1	0.5	5.1	118	0.3	118	4.8	0.3	4.8
Chon Buri	e	121.3	1.0	1	0.2	28.1	2.5	28.1	307	0.7	307	0.2	0	
Rayong	e	639.8	5.2	7	1.4	24.3	2.2	3.5	540	1.3	77	6.1	0.3	2
Sra Keao	e	4.2	0.0					0						
Trad	e	198.0	1.6	18	3.6	41.9	3.8	2.3	1044	2.5	58	23.9	1.3	2.2
Karn Chanaburi	w	3.5	0.0	1	0.2	3.8	0.3	3.8	83	0.2	83	11.4	0.6	
Prajoub Kiri Khan	w	28.2	0.2											
northeast provinces / Buriram (survey)	ne	283.9	2.3	3	0.6	20.9	1.9	7	1227	2.9	409	26.6	1.4	8.9
Total (RRIT) / all cooperatives (survey)		12.249.077	100	506	100	1106.5	100	2.2	41909	100	83	1880.0	100	4.5

Source: cooperative survey 2001, ORRAF/RRIT/ESI-VU (except rubber area 1996); 1 ha. is equal to 6.25 rai (or 1 rai is equal to 0.16 ha.)

Table 2 Cooperatives of natural rubber farmers in Thailand: average area, production and yield by individual member

	area of member of cooperative in rai			production of member of cooperative in kg. per day			yield of member of cooperative kg per day & rai		
Province	average	minimum	maximum	average	minimum	maximum	average	minimum	maximum
Chumpon	41.7	12.7	159.7	56.6	30.6	83.1	5.9	3.5	7.7
Krabi	40.3	6	79.9	46.3	20.3	80.3	1.4	0.7	2.3
Nakorn Si Thammarat	26.4	4.7	73.3	49.4	20.8	84.5	5.6	2.7	12.2
Narathiwat	30.1	4	54.4	37.2	13.6	43.7	1.7	0.8	2.9
Pattani	20.8	3	90.9	30.2	15.5	44.8	6.9	2.8	8.5
Phangnga	54.8	6.3	128.8	29.7	11.1	49.3	1.2	0.4	1.9
Phatthalung	20.7	4.2	60.8	41	17.2	67.5	2.2	1	3.6
Phuket	24.2	7.5	50	7.4	2.5	15.7	0.1	0.1	0.3
Ranong	35.4	16.8	76.3	24.3	19.7	28.8	0.8	0.6	1
Satun	25.3	6.9	85.4	33.2	19	63.2	1.4	0.8	2.6
Songkla	28.3	6.4	85.1	46	18.7	110.7	3.5	0.8	5.4
Surat Thani	59.6	9.1	120.9	57.1	27.3	93.5	1.6	0.7	2.6
Trang	29.1	5.1	77	47.2	22.2	80.1	1.9	0.9	3.2
Yala	37.9	8.3	100.4	29.8	14.9	86.7	1.1	0.5	2.7
Chachongsar									
Chantaburi	43.5	5	120	5.1	4.2	5.9	0.1	0.1	0.1
Chon Buri	91.6	10	700	53.7	32.6	130.3	0.6	0.4	1.4
Rayong	68.4	8.6	164	35.1	15.3	57.3	0.7	0.3	1.1
Sra Keao									
Trad	75.7	4.6	73.2	58.2	24.3	92.3	1.7	0.9	2.7
Karn Chanaburi	45.8	10	500						
Prajoub Kiri Khan									
Northeastern provinces / Buriram	16.4	5.7	66.7	39.9	15	69	2.3	0.9	4
Total / all cooperatives	34.6	6.0	87.2	44.7	19.7	80.5	2.9	1.2	5.1

Source: cooperative survey 2001, ORRAF/RRIT/ESI-VU

Table 3a Rubber farmers and cooperatives registered at intervention points

	farmers			cooperatives			
	number	area in rai	share in province /a	number	number of farmers	area in rai	share in province /a
Chumphon	645	21,967	6.9%				
Krabi	3,271	96,033	15.4%	3	71	4,750	0.8%
Nakhon Si Tammarat	14,303	314,107	22.3%				
Narathiwat	124	2,264	0.3%	1	10	300	0.0%
Pattani	605	7,704	2.8%	4	194	42,943	15.8%
Patthalung	2,428	51,257	10.0%	3	202	3,114	0.6%
Phangnga	2,809	83,786	13.6%	4	94	3,847	0.6%
Phuket	16	520	0.5%				
Prachoubkirikhan	167	6,198	22.0%				
Ranong	145	4,747	5.9%				
Satul	115	2,408	0.9%				
Songkhia	2,516	71,739	4.3%	6	610	18,003	1.1%
Surat-tani	19,508	704,948	42.4%	14	1,061	29,290	1.8%
Trang	3,643	107,571	10.2%	14	19	20,763	2.0%
Yala	70	2,258	0.2%	1	25	848	0.1%
subtotal	50,365	1,477,507	14.1%	50	2,286	123,858	1.2%
Chachocngsao	819	24,449	147.3%				
Chanthaburi	253	8,087	1.5%	1	10	615	0.1%
Chonburl	271	16,453	13.6%				
Kanchanaburi	11	518	14.6%				
Rayong	879	34,016	5.3%				
Trad	382	11,501	5.8%				
subtotal	2,615	95,024	6.3%	1	10	615	0.0%
Buriram	986	14,070	48.4%	1	40	658	2.3%
Kalasin	66	653	5.9%				
Konkaen	27	306	12.6%				
Mahasalakarm	8	74	6.3%				
Mookdaharn	97	957	17.4%				
Nakhonpanom	919	12,077	45.1%				
Nongbualumpoo	19	274					
Nongkai	212	5,063	7.0%				
Sakonnakhon	41	688	5.0%				
Srisaked	57	1,290	6.5%				
Ubonraluhatani	34	485	4.2%				
subtotal	2,466	35,937	12.7%	1	40	658	0.2%
TOTAL	55,446	1608468	13.1%	52	2336	125131	1.0%

Source: RRIT

/a Share in % of rubber area by province taken from RRIT, 1996 (see also Table 1)

(we suspect data errors in the shaded cells)

Table 3b **Share of sales revenues from sales to intervention authority**

	no. of observations	share of intervention sales (in %)
Trang	57	72.1
Krabi	23	65.5
Chumporn	14	62.3
Surat Thani	22	58.8
Pattalung	47	58.7
Satun	13	56.5
Nakorn Si Tammarat	75	46.5
Songkhla	74	44.9
Yala	14	43.2
Pattani	17	30.2
Naratliwat	26	29.0
Pang-nga	11	17.3
Trad	11	17.1
all cooperatives	419	50.7

Source: cooperative survey 2001, ORRAF/RRIT/ESI-VU

Table 4 **Bank accounts of cooperatives and members of cooperatives (in %)**

		cooperatives		members	
	no. of observations	accounts at banks	accounts at BAAC	accounts at banks	accounts at BAAC
Satun	13	84.6	84.6	7.7	7.7
Chumporn	16	93.8	81.3	25.0	6.3
Surat Thani	34	85.3	79.4	17.7	17.7
Trang	65	84.6	78.5	30.8	30.8
Pattalung	48	72.9	68.8	22.9	18.8
Nakorn Si Tammarat	87	80.5	63.2	13.8	6.9
Songkhla	88	76.1	53.4	14.8	13.6
Krabi	28	60.7	50.0	3.6	3.6
Trad	18	88.9	50.0	33.3	0.0
Naratliwat	34	61.8	41.2	8.8	8.8
Pattani	18	50.0	38.9	0.0	0.0
Pang-nga	22	54.6	36.4	4.6	0.0
Yala	14	92.9	35.7	42.9	28.6
all cooperatives	506	76.9	60.9	19.2	14.0

Source: cooperative survey 2001, ORRAF/RRIT/ESI-VU

Table 5 Willingness to pay, by province

province	question 1 /a no. of obs #	question 1 /a willingness to pay %		question 2 /a no. of obs #	question 2 /a willingness to pay %
Trad	18	88.9%			
Trang	65	76.9%	Trang	65	76.9%
Songkhla	88	65.9%	Pattalung	48	64.6%
Nakorn Si Tammarat	87	59.8%	Songkhla	88	61.4%
Surat Thani	34	58.8%	Nakorn Sri Tammarat	87	56.3%
Pattalung	48	56.3%	Surat Thani	34	52.9%
Krabi	28	46.4%	Krabi	28	46.4%
Pang-nga	22	40.9%	Naratliwat	34	38.2%
Naratliwat	34	38.2%	Pang-nga	22	31.8%
all cooperatives	506	61.5%	all cooperatives	506	58.9%

Source: cooperative survey 2001, ORRAF/RRIT/ESI-VU

/a question 1 pertains to willingness to pay by cooperatives and question 2 pertains to willingness to pay by members, as evaluated by the interviewed manager of the cooperative. The answers to question 2 will be less reliable, and, hence is not used in the analysis below.

Table 6 Willingness to pay for market based insurance related to other variables

Willingness to pay and average area of individual member

	Average area in rais per cooperative member							
	<10	10-20	20-30	30-40	40-50	50-60	>60	Total
total number	26	104	105	59	42	22	12	370
willing to pay (in %)	69.2%	63.5%	54.3%	66.1%	59.5%	72.7%	66.7%	61.9%

Willingness to pay and average production of individual member

	Average production in kg per cooperative member											
	<10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	>100	total
total number	25	42	82	78	68	49	26	17	11	10	20	428
willing to pay (in %)	64.0%	45.2%	64.6%	61.5%	77.9%	67.3%	76.9%	64.7%	54.5%	70.0%	50.0%	64.5%

Willingness to pay for market based insurance and sales revenues of cooperatives

	Sales revenues in 1,000,000 baht (fiscal year 1999-2000)										
	<1.0	1.0-2.0	2.0-3.0	3.0-4.0	4.0-5.0	5.0-6.0	6.0-7.5	7.5-9.0	9.0-11.0	>11.0	Total
total number	51	53	54	69	49	42	33	27	24	17	419
willing to pay (in %)	56.9%	60.4%	68.5%	62.3%	59.2%	59.5%	63.6%	70.4%	58.3%	76.5%	62.5%

Willingness to pay and bank accounts of cooperatives and members of cooperatives (in %)

	accounts at banks (cooperatives)			accounts at banks (members of cooperatives)		
	no	yes	total	yes	no	total
willing to pay	16.2%	75.1%	61.5%	55.3%	74.2%	58.9%

Willingness to pay and share of sales revenues to intervention authority

	share of sales to intervention authority in total sales revenues										
	<10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%	total
total number	149	9	4	11	23	22	16	26	24	135	419
willing to pay	47.0%	66.7%	50.0%	72.7%	73.9%	77.3%	81.3%	65.4%	75.0%	69.6%	62.5%

Source: cooperative survey 2001, ORRAF/RRIT/ESI-VU

Table 7 Willingness to pay for market based insurance: multivariate analysis

probit estimation dependent variable: willingness to pay for market based insurance (dummy)	coefficient	z-value	coefficient	z-value	coefficient	z-value	coefficient	z-value
major commercial activity (dummy)								
processing fresh latex into RSS or crepe	0.592	2.6	0.692	3.5	0.599	3.5	0.294	1.4
selling of fresh latex	-0.379	2.2	-0.246	1.6	-0.308	2.2	-0.199	-1.3
buying and selling of herbicides	0.327	1.5	0.323	1.6	0.367	2.0	0.160	0.8
operating a shop for members	-0.620	2.1	-0.507	1.8	-0.589	2.3	-0.710	-2.4
province (dummies)								
Nakorn Si Thammarat	-0.322	1.5	-0.335	1.6	-0.255	1.4		
Pattalung	-0.494	2.0	-0.415	1.7	-0.260	1.1		
Pattani	0.934	2.0	0.676	1.6	0.756	2.2		
Rayong	-1.287	1.4	-0.988	1.6	-0.890	1.7		
Satun	-0.427	1.0	-0.410	1.0	-0.259	0.6		
Surat Thani	-0.700	2.1	-0.464	1.7	-0.389	1.5		
Trad	1.766	2.7	1.702	2.8	1.223	2.7		
bankaccount at cooperative (dummy)	1.528	7.0	1.664	8.6	1.722	10.3	1.454	7.1
total sales revenues (x1,000,000)	0.037 /c	1.6					0.017 /c	0.8
sales to intervention authority /a	0.004	2.0					0.003	1.6
sharecropping members /b	-0.007	2.1	-0.005	1.8			-0.004	-1.2
constant	-1.146	3.4	-1.111	3.9	-1.360	6.7	-1.014	-3.3
number of observations	356		414		506		356	
Logliklihood	109.7		127.0		171.5		86.1	
Pseudo R2	0.236		0.233		0.254		0.186	

Source: cooperative survey 2001, ORRAF/RRIT/ESI-VU; calculations by ESI-VU

/a share of sales to intervention authority in percentage of total sales revenues

/b share of members involved in sharecropping in percentage of total number of members of the cooperative

/c x 10^{-6}

Appendix A

PROJECT PROPOSAL

Assessing the feasibility of transmission of risk management instruments to natural rubber smallholders in Thailand

23 January 2001

1. Introduction

The International Task Force on Commodity Risk Management in Developing Countries (ITF) has recently proposed an initiative to make risk management tools more widely accessible to smallholder farmers in commodity-producing developing countries (ITF, 1999). This proposal has the objective of assessing the cost and feasibility of these proposals in relation to smallholder farmers growing natural rubber. The proposal is a joint initiative of the International Rubber Study Group (the IRSG) and the Economic and Social Institute (the ESI) at the Free University, Amsterdam.

The current proposal benefits from two important activities:

- A preparatory paper has been written for the ITF. This preparatory paper has inputs from both parties involved in the current proposal, the IRSG and the ESI. The current proposal is therefore well prepared in terms of substance and cooperation between the IRSG and the ESI;
- During the course of writing this preparatory paper as well as the current proposal the IRSG and the ESI have had detailed discussions with officials from Thailand. There is great enthusiasm from the side of Thai officials for the current project proposal. This was expressed by Mr. Chakarn Saengruksawong, Deputy Director of the Department of Agriculture. They have suggested to compose a counterpart group consisting of Mr. Prasat Kesawapitak, Director of the Rubber Research Institute of Thailand, Mr. Jinda Pooriwarang-Goon, Deputy Director-General of the Office of the Rubber Replanting Aid Fund, dealing especially with smallholders cooperatives, and Dr. Wate Thanugul, Managing Director of the Thai Rubber Association, representing the traders and processors. This will allow the preparation of the project to start right away and the mission to start within weeks after the start of the project.

Below the various aspects of the project are presented followed by

2. Project objective

Globalization, the increasing liberalization of world commodity markets, and the dismantling of domestic price-support institutions in commodity-producing developing countries have all increased the exposure of smallholder commodity producers to price volatility. In the case of natural rubber, this increased exposure has been exacerbated by the collapse of the International Natural Rubber Agreement (INRA), which, since 1979, has attempted to smooth rubber prices.[18] Market-based commodity price risk-management instruments offer the possibility of managing commodity price risk in this new, more volatile, environment. A large number of studies, both theoretical and empirical, have demonstrated that these instruments are more efficient, less costly and more welfare-enhancing relative to standard price stabilization schemes.[19] However, actual use of these instruments by developing country producers remains low. This

[18] See Herrmann, Burger and Smit (1993), Chapter 1 and 7 for an overview of international pricing arrangements in the natural rubber market.
[19] See e.g. Newbery and Stiglitz (1981), Gilbert (1993), Claessens and Duncan (1993), Zant (1998, 2000).

may be due in part to "market failures", in part to high costs, and in part to inadequate instrument availability.

The objective of this project is to examine the feasibility of intermediation of risk management instruments to smallholder natural rubber farmers. We propose to undertake a detailed study of the feasibility of this approach in relation to the natural rubber industry in Thailand. We propose to consider

d) the extent of farmers' current exposure to rubber price volatility, its importance and the means they currently have for protecting themselves against this volatility;
e) potential availability of risk management instruments suitable for intermediation to these farmers; and
f) the availability of suitable intermediation agencies.

3. The potential availability of instruments

The ITF consensus was that, in general, there exists substantial private sector interest in the provision of risk management instruments. However, in the current situation in which there is little effective demand for these instruments on the part of developing countries, the potential supply may not be evident. But while this may be true in general terms, it will be important to document the potential availability of risk management instruments for natural rubber farmers. In doing this, it is important to distinguish between the wholesale and the retail markets.

At the wholesale level, we need to ask

- Whether there currently exist exchange-traded instruments which are suited to the risk management problem faced by farmers in that country;
- Whether there currently exist OTC instruments which are suited to the risk management problem faced by farmers in that country; If such instruments exist, how expensive are these instruments, how much does price decrease with large volumes, what are the conditions for contract partners?
- With respect to existing contracts, are the contracts that are available of sufficient length? Might it be possible for contract lengths to be extended through an earlier start to trading for new contract months?
- If there are no suitable instruments, or no suitable instruments at a reasonable price, is this because of exchange rate or other forms of basis risk, or for other reasons?
- Might it be possible for existing exchanges to create new products that reduce this basis risk?
- Would it be feasible to establish local domestic exchanges that could provide suitable instruments?

This section of the study will involve our meeting representatives of one or more of the three futures exchanges that currently trade natural rubber (Osaka, Singapore and Tokyo), representatives of the government of Thailand an exchange is currently planned, banks and other companies in the producing countries that trade natural

rubber futures and options or that are potentially capable to develop products in this area.

On the basis of our current knowledge of the rubber industry, it appears that suitable futures and options-based instruments are available, generally on an OTC basis, but that the institutions providing these instruments face problems in offsetting their risk on what are currently fairly illiquid exchange markets. This risk can add to the cost of the instruments. It will be important to assess whether, and to what extent, increased business from rubber smallholders might alleviate some of these problems. A second problem is that the wholesale trade is currently entirely dollar-based, and this gives rise to considerable basis risk in making instruments available in local currencies. This risk will further increase the cost of retail provision. It seems likely that this risk might be significantly reduced through development of local rubber futures markets, at least in one or two major producing countries. The study will investigate the desirability and feasibility of these developments.

The outcome of this section of the study should enable us to see the extent to which increased effective demand for risk management instruments will translate into supply at an affordable price. With respect to various forms of risk involved in providing risk management instruments, the potential contribution of an international intermediate as proposed by the ITF will be considered.

4. Local intermediation

The intermediation issue, which arises because of the need to make risk management instruments obtained at the wholesale available at the retail level. Intermediation is necessary because few smallholders or small rubber factories will have the knowledge, skills or credit status required for direct access to wholesale markets; and indeed, the same considerations apply also in developed country agricultural markets. Furthermore, smallholders will not be trading in a size which will make them interesting to banks and exchanges. Intermediation is the process by which wholesale products are packaged for the retail market and the resultant smallholder demand is aggregated to sufficient size to make it attractive to the wholesale suppliers.

Intermediation may be undertaken either by existing institutions or by organizations newly created for this purpose. We will investigate which existing organizational structures are appropriate for effectively performing the risk management of these smallholders.

There are various arrangements that may be available for the intermediation of risk management to rubber farmers. The precise arrangements will depend on the institutions and traditions of each country. One possibility is the following. Natural rubber processors purchase unsmoked sheet rubber from middlemen, who aggregate smaller packages of sheet purchased from the smallholders. Middlemen typically sell to processors on the basis of the best prices quoted and are not tied to particular buyers. However, they tend to have long term relationships with their smallholders. This may include provision of credit and, in certain countries also fertilizers. By purchasing risk

management instruments, a processor can offer middlemen the possibility of offering floor prices to smallholders a number of months ahead. This implies that the middlemen may be regarded as "points of constriction" in the marketing chain. Previous research has indicated that risk management instruments may best be intermediated to smallholders through such points of constriction. Experience in other commodities also emphasizes the possibility of economies of scope in the joint intermediation of risk management instruments together with credit and/or agricultural inputs (fertilizers, insecticides).

Among other organizations that might fulfill the criteria to qualify as or Local Transmission Mechanisms (LTM[20]) are

- futures exchanges (global, regional or national);
- local auctions;
- large smallholders;
- producer cooperatives;
- processors;
- large traders;
- banks;
- industry organizations;
- former commodity boards or caisses.

With respect to each of these types of organization, we will attempt to establish

- whether and to what extent they currently deal with rubber smallholders, and if so, in what capacity(ies) they do this;
- if they do not currently deal with smallholders, whether they would be able and interested in extending their activities in this direction, and if so, what remuneration they would require to do this;
- what experiences these organizations have in the rubber industry; and if they do not currently benefit from such experience, whether they would be able and willing to acquire it;
- whether these organizations are currently involved in the intermediation of credit or of agricultural inputs to smallholders, and, if not, whether they are interested in entering these activities;
- what experience, if any, the organizations have in dealing with foreign exchange transactions and foreign exchange risk; and if they have no current experience in this regard, whether they would be able and willing to develop that capacity.

The outcome of this part of the project should allow clear discrimination between candidate organizations that (might) qualify as LTMs. We will spell out under what conditions the existing risk providers are willing to do business with the local organization, i.e. the LTM that acts on behalf of smallholders or small traders. We will evaluate the obstructions that currently prevent these transactions in the countries or localities under consideration and suggest ways in which the organizations might

[20] The term "Local Transmission Mechanism" is taken from the ITF proposal, see International Task Force on Commodity Risk Management in Developing Countries, 1999.

successfully involve themselves in intermediation. and the type and level of assistance that this might require. Finally, we will make recommendations as to the choice of LTM.

5. Price

The price at which the risk management instruments are sold to farmers is of critical importance. Successful intermediation on the user side requires that the smallholders are interested to purchase the insurance. How much is the smallholder prepared to pay for price insurance? In order to answer this question we need to undertake substantial investigations among the smallholder cooperatives. We will ask

- To what extent are income-risks for the farm household diversified by cultivating different crops or by having different sources of income?
- Supposing that price insurance is available 3-12 months ahead, will this affect the choice of crops to be cultivated and the pattern of (crop and labor time) diversification?
- Under what conditions are smallholders interested in hedging facilities?
- How much are smallholders prepared to pay for price insurance?[21]
- Do smallholders have sufficient trust and confidence in the functioning of the suggested intermediaries?

We will include this in a survey among Thai natural related cooperatives. This information should enable us to assess how much are farmers prepared to pay for price insurance.

The natural rubber industry has a tradition in which governments have devoted funds to price stabilization, most notably through the INRO buffer stock scheme. Governments (most notably that of Thailand) also have domestic price support schemes. It is possible that, with the ending of international price stabilization, governments may be willing to reallocate some of the funds previously devoted to these activities to the intermediation of risk management instruments to smallholders. In particular, it may be more attractive for governments to subsidize the purchase of price insurance than to directly guarantee minimum price levels. If this transpires to be the case, it could significantly reduce the price farmers would be required to pay for these services, and thereby significantly increase the attractiveness of the scheme. The outcome of this part of the project will form an important component in assessing the viability of any proposed intermediation scheme.

6. Contract enforcement

Previous commodity risk management studies have indicated that the issue of contract enforcement is likely be of critical importance to the success of any scheme. The LTM is required to be capable of enforcing the compliance of any contracts to which it is a party. This issue will arise specifically in any arrangement in which risk management

instruments are purchased on a credit basis (for example, out of projected future rubber revenues) and focuses attention on the enforcement mechanisms available to the candidate LTMs. Credit is also important in that, as noted above, there are possible economies of scope in packaging credit and risk management together in retailing to rubber smallholders, and risk management and credit tend to be joint products because by making projected revenues less risky, hedging allows borrowing against these revenues on finer terms. We therefore propose to give particular attention to the current availability of credit to rubber smallholders, the terms on which this is available, and the enforcement mechanisms at the disposal of the lenders. We will further examine the extent to which these organizations are willing and able to participate in the intermediation of risk management instruments, and the returns they would require to participate in this activity.

The following questions should be addressed in the assessment of organizations as potential intermediaries of risk management instruments. In particular, it will be necessary to assess the general commercial capabilities of potential intermediaries:

- What is the relevant experience of the organization? Is the organization involved in any kind of commercial activity with the group of smallholders (e.g. selling inputs like fertilizer, pesticides or fungicides, offering storage facilities or extension- or marketing services, or providing processing treatments)? What is the track record of the organization in these activities? Has it shown to be capable of running a financially sound business?
- Does the organization have sound and transparent accounting procedures and management capabilities and is it prepared to submit to full auditing procedures by international experts?

Second, there are issues specifically related to risk management instruments

- Is the organization currently engaged in any type of risk management activity?
- Is there adequate capacity to deal with the technicalities of using risk management instruments, or is it possible to obtain this capacity on short notice?
- Is the organization currently engaged in any type of supply of credit to smallholders?
- Under what conditions is (would) the organization (be) prepared to assume price risks of smallholders?
- What is the extent of coverage of the group of smallholders, and, given this coverage, to what to extent will the available hedging services reach the smallholder?
- How is the organization planning to enforce compliance to contracts, also in terms of quality?
- Will the organization be willing and capable to borrow in order to meet margin calls on the futures that they purchase?
- Is the organization acceptable as a trading partner to providers of risk management instruments?

[21] Answers to this last question may be influenced by the current price of the commodity..

The outcome of this component of the study will, together with the assessment of the price farmers are willing to pay for risk management, form the basis for judging the financial feasibility of proposed risk management intermediation schemes. Furthermore, it will allow the project team to propose intermediation channels and LTMs that will maximize the probability of successful intermediation at sufficiently low cost.

7. Project implementation

The implementation of the project is intended to follow, so far as is possible, a bottom-up approach as opposed to a top-down approach. A bottom-up approach is justified as the eventual goal of this whole exercise is to decrease price risks and to increase welfare of individual smallholders. We propose to examine the potential for risk management intermediation in detail in Thailand. Thailand plays a special role because

- Thailand is the leading producer of natural rubber;
- the government of Kingdom of Thailand is currently considering proposals for the introduction of futures trading in natural rubber;
- funds currently held in a Thai government-run natural rubber stabilization fund might be available for assisting farmers in the purchase of risk management.
- the experience of Thailand and the possibilities seen for Thailand may provide lessons to the other countries.

The participating IRSG staff member of the proposed project team is very well qualified to participate. Dr Prachaya Jumpasut is a Thai national as well as Head of Economics and Statistics at the IRSG secretariat. He has extensive connections in relevant government departments in his home country and is well acquainted with the natural rubber sector.

We propose to examine

- pricing arrangements,
- marketing channels,
- market structure,
- farm-gate prices relative to export prices,
- crop financing, and the availability of credit to smallholders.

This investigation will establish who bears the risk, which organizations are active in the chain from production to consumption, what is their role in the entire market, with whom do these organizations have transactions and to what extent do these organizations assume risk.

We will frame a number of candidate means to intermediate suitable risk management instruments to rubber smallholders. These will not be proposals, since that would require detailed costing and more extended feasibility studies, but rather realistic possibilities. The suggestions will take into account current involvement in the sector, ability to monitor and control risks, financial strength, and the complexity of the intermediation problem given the likely potential availability of instruments. Finally

we will suggest a feasible plan to achieve successful intermediation from provider through a suitable LTM to smallholder farmers.

8. Proposed activities

Preparatory activities will comprise

a) Preparation of the mission: collection of names and addresses of local marketing organizations and exchanges, regional auctions or futures markets, local experts, large traders, traders organizations, producer organizations, processing industries, storage and processing cooperatives, banks active in financing agriculture or agricultural processing, etc; this will be largely done by the counterparts in Thailand
b) Elaboration of an intermediary organization (LTM) questionnaire to streamline the information that will become available from interviewing the local organizations;
c) Elaboration of a questionnaire for (potential) providers of risk management instruments and for companies that actively do transactions on international futures exchanges in order to streamline the information that will become available from interviewing these providers and companies;
d) Preparation of a cost-benefit framework will involve designing a plan to track natural rubber prices at different stages of the marketing chain, i.e. farm-gate, fob, international physical and futures prices; this should enable us to calculate the maximum premiums and the cost/benefit to the participants involved during the testing period;
e) Drawing up a working plan for a selected number of localities to be visited within each country and organizations to interview; we will contact the organizations that are to be visited and circulate a document that gives information on the objectives of the investigation and on the background of the project.

After the preparatory stage the real work starts with in Bangkok. The project will have two teams in Thailand working parallel. Team A will cover the demand side looking particularly at LTMs. This will include

a) Meetings in Bangkok with the Rubber Research Institute of Thailand (RRIT), the Office of the Rubber Replanting Aid Fund (ORRAF), and other parts of the Ministry dealing with farmer cooperatives and the like.
b) Similar activities will be undertaken in Hat Yai in Southern Thailand, the center for natural rubber.
c) Afterwards interviews will be held especially with smallholders cooperatives in Hat Yai and in three other locations in the South, Trang, Nakhorn Si Thammarat and Surat Thani.
d) Interviews will also be held with candidate intermediate organizations such as marketing institutions and banks and other credit agencies;
e) A survey will be undertaken to assess the conditions under which farmer cooperatives are interested and capable to participate in this activity.

Team B will concentrate on the supply side of risk management instruments: providers (banks etc.), governments and other potential actors (large traders, cooperatives, processors, local banks etc.). Activities during the mission will comprise

a) Meetings in Bangkok with the Rubber Research Institute of Thailand (RRIT) which is coordinating the project on the Thai side;
b) Visit national ministries in Bangkok in order to obtain relevant information on local structures and organization of producers, views on likely evolution of the natural rubber sector, and information on the possible availability of national funds;
c) Visit firms involved in futures and options trading, and organizations involved or interested in setting up local futures markets;
d) Visit marketing institutions, banks and other credit organizations involved in lending to rubber smallholders.

Afterwards the two teams will join again in Hat Yai to discuss the results. The mission will be completed with a meeting in Hat Yai to which all parties involved will be invited including e.g. representatives from the Singapore Commodity Exchange. At this meeting the preliminary results of the project will be presented and discussed. As mentioned in the Introduction, preparatory work for this project has already been done. The missions will form the basis for a draft report, to which the results of the survey among LTMs will be added. Afterwards there will be a meeting in London to discuss the draft report before finalizing it.

9. Project output

The project report will present conclusions on the following issues:

- An assessment of farmers' willingness to pay for risk management and hence the desirability and financial viability of any proposed risk management scheme in natural rubber.
- An assessment of the extent to which increased effective demand for risk management instruments will translate into supply at an affordable price. This will involve judgments on the adequacy of existing futures and options markets for risk management by smallholder farmers, and the extent to which any current inadequacies may be remedied by trading of additional contracts and/or the creation of new exchanges.
- Discrimination between candidate organizations that (might) qualify as LTMs. We will spell out under what conditions the existing risk providers are willing to do business with the local organization, i.e. the LTM that acts on behalf of smallholders or small traders. We will evaluate the obstructions that currently prevent these transactions in the countries or localities under consideration and suggest ways in which the organizations might successfully involve themselves in intermediation. and the type and level of assistance that this might require.

- An assessment of the extent to which contract performance issues will add to the cost or reduce the practicability of proposed intermediation arrangements, and how these difficulties may be overcome.
- A tested format including questionnaires for farmers, LTMs, providers and government which will be useful for application to natural rubber as well as to other commodities.

10. Workplan

The following activities can be distinguished:

1 preparation of the mission, including collecting names and addresses
2 elaboration of LTM questionnaire
3 elaboration of provider questionnaire
4 elaboration of government questionnaire
5 elaboration of cost-benefit framework
6 mission to Thailand, team A
7 mission to Thailand, team B
8 drafting report, including results of survey among LTMs
9 meeting in London
10 final report

It is planned to do the missions to Thailand in February 2001. The final report will be ready in early April 2001.

The participating organizations are:

Officials in Thailand
Mr Prasat Kesawapitak, Rubber Research Institute of Thailand
Mr Jinda Pooriwarang-Goon, Office of the Rubber Replanting Aid Fund
Dr Wate Thanugul, Thai Rubber Association
From the side of the officials in Thailand representatives will be assigned later.

International Rubber Study Group (IRSG):
Dr. A.F.S. Budiman
Dr. Prachaya Jumpasut
From the side of the IRSG Dr. Jumpasut will be involved in the missions.

Economic and Social Institute (ESI), Free University, Amsterdam, The Netherlands
Dr. Kees Burger
Prof.Dr. Christopher Gilbert
Dr. Hidde P. Smit
Dr. Jan ter Wengel
Dr. Wouter Zant
From the side of the ESI Prof. Gilbert, Dr Smit and Dr Zant will be involved in the missions.

The composition of the teams will be as follows:
Team A: Dr. Smit, Dr. Zant and representatives from Thailand
Team B: Dr. Gilbert, Dr. Jumpasut and representative from Thailand

The workplan is as follows:

	Week											
Activity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1 preparation of mission												
2 LTM questionnaire												
3 provider questionnaire												
4 government questionnaire												
5 cost-benefit framework												
6 mission to Thailand, team A												
7 mission to Thailand, team B												
8 drafting report, incl. LTM surveys												
9 meeting in London												
10 final report												

			Team A					Team B - IRSG		Team B - ESI	
			Bangkok	Hat Yai	Trang	Nakhorn ST	Surat Thani	Bangkok	Hat Yai	Bangkok	Hat Yai
February	4	Sunday									
	5	Monday	2								
	6	Tuesday	2								
	7	Wednesday	2					1		1	
	8	Thursday		2				1		1	
	9	Friday		2				1		1	
	10	Saturday		2				1		1	
	11	Sunday			2			1		1	
	12	Monday			2			1		1	
	13	Tuesday				2			1		1
	14	Wednesday					2		1		1
	15	Thursday					2		1		1
	16	Friday		2					1		1
	17	Saturday		2					1		1
	18	Sunday		2					1		1
	19	Monday		2					1		1
	20	Tuesday		2					1		1
	21	Wednesday									
	22	Thursday									
			6	16	4	2	4	6	8	6	8

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Appendix B

MARKET BASED PRICE INSURANCE IN THE THAI NATURAL RUBBER MARKET: POSSIBLE ROLES FOR COOPERATIVES

QUESTIONAIRE FOR THAI NATURAL RUBBER COOPERATIVES
JOINT PROJECT BY ESI-VU, IRSG AND WORLD BANK

General information of the cooperative

1 Names and addresses

cooperative	
name	
address	
village / town	
district	
interviewee	
name	
position*	
age	
years in current position	
date of interview	

* for example chairman, deputy chairman, manager, etc.

Commercial activities

2. Indicate current commercial activity of your cooperative

rank number	activity	
1	processing fresh latex into USS	
2	processing fresh latex into RSS	
3	processing fresh latex into yellow crepe	
4	processing fresh latex into air dried sheets	
5	selling of fresh latex if processing capacity is fully used	
6	growing rubber trees on cooperative owned land	
7	growing other crops on cooperative owned land	
8	hiring out cooperative owned land	
9	saving and lending of members	
10	buying and selling of fertilizer	
11	buying and selling of herbicides	
12	buying and selling of pesticides	
13	selling or providing health insurance	
14	selling or providing funeral insurance	
15	selling or providing other insurance (specify):	
16	selling transportation services (lorry)	
17	operating a shop for members	
18	other (specify):	

Processing capacity

3. How did your production capacity in natural rubber processing develop over time?

activity*					
year of starting					
capacity at start**					
current capacity**					
set-up costs of factory***					
how financed****					

* use ranknumber of activity from question 2 of this questionnaire; use separate column if more capacity is installed in the course of the years for the same processing activity;

** dry weight in tonnes per day

*** in millions of Baht (x 1,000,000 Baht)

**** 1: grant; 2: loan; 3: retained profits of the cooperative

4. Do you plan to expand your production capacity in natural rubber processing?

activity*			
capacity of planned expansion**			
funding***			
in which year?			

* use ranknumber of activity from question 2 of this questionnaire;

** dry rubber weight in tonnes per day per day

*** 1: grant; 2: loan; 3: retained profits

5. What is the main reason for expanding your production capacity in natural rubber processing?

1	to adjust the capacity to the supply of fresh latex of the current members	
2	to be able to increase the number of members	
3	to be able to react more flexible on price movement in selling markets	
4	other reason (specify):	

6. Do you plan to expand to other commercial activities?

activity*					
specify if activity is not listed:					

* use ranknumber of activity from question 2 of this questionnaire;

7. What is the main reason to expand to the commercial activities of question 6?

1	to earn a return on retailing services & products to members at a discount	
2	to earn a return on spare capacity of the cooperative	
3	to benefit from less fluctuating prices (up-stream activity)	
4	to extend the services to the members	
5	other reason (specify):	

Current operations

Answers to the following questions should be based on the **last year (2542-2543)** annual financial report (unless indicated differently)

8. Could you give a break down of the total last year costs and total last year sales?

costs in 2542-2543	**amount in Baht**
fresh latex purchased from farmers	
wages to employees	
costs of material inputs	
costs of services	
depreciation costs	
interest costs of loans	
other major costs (specify):	
total costs	
sales revenues from selling processed rubber in 2542-2543	
sales revenues from selling USS	
sales revenues from selling RSS	
sales revenues from yellow crepe	
sales revenues from ADS	
sales revenues from selling other processed rubber	
total sales	

9. Could you give a break down of total last year profits

profits in 2542-2543 distributed as	**amount in Baht**
payback to members on the basis of shares in capital	
payback to members on the basis of supplied fresh latex (dry weight)	
capital accumulation / addition to reserves	
bonuses to managers and employees	
payment to the apex organisation	
total profits in 2542-2543	

Profits and profit regulation

10.Could you give an account of your regulation on the distribution of profits?

profit distributed as	**minimum share in total profits in %***	**maximum share in total profits in %***
payback to members on the basis of shares in capital		
payback to members on the basis of delivered fresh latex (dry weight)		
capital accumulation / addition to reserves		
bonuses to managers and employees		
payment to the apex organisation		

* Only necessary to fill in if minimum or maximum shares are regulated

11.Could you give the total annual profits of over the last 5 years?

fiscal year	total profits (in Baht)*
2538-2539	
2539-2540	
2540-2541	
2541-2542	
2542-2543	

* add minus (-) in case of a loss

Cost of production by activity, wages and employment

12.Could you give the cost of production per kg by processing activity ?

activity*	cost in Baht per kg (dry rubber weight)

* use rank number of activity from question 2 of this questionnaire

13.How many employees are currently on the payroll of the cooperative and what is there wage in 2542-2543?

type of employees	number	total wages in Baht	wage per person in Baht*
managers			
administrative personnel			
factory workers			
other employees (specify):			

* give average wage if more employees in this category with different wages

Coverage of total natural rubber growers

14.To what extent does your cooperative cover the natural rubber growers in your area?

current number of members	
number of members at start	
total production of all members per day in tonnes per day fresh latex:	
average	
minimum	
maximum	
what is the average dry rubber content (drc) of fresh latex	
total area of members in rai	
smallest area in rai of individual member	
largest area in rai of individual member	
current share of the number of sharecroppers under your members in %	
(only sharecroppers:) distribution of revenues between owners and tappers in %	
owners:	
tappers:	
share of number of members in total number of natural rubber growers around your cooperative	
share of area of members	

in total area of natural rubber growers around your cooperative	
share of production of members in total production of natural rubber growers around your cooperative	

Individual member versus cooperative, and price determination of fresh latex

15.Could you give an overview of all costs to an individual member?

initial payment to capital (share) in Baht	
initial fee in Baht	
other conditions for membership (specify):	

16.Could you give an overview of *last year*'s benefits to an individual member per kg of delivered fresh latex (dry weight)?

price of fresh latex (average)	
(claim on) profits	
other benefits directly related to production of natural rubber specify:	
other benefits **not** related to production of natural rubber specify:	

17.If you supply fertilizer, herbicides, pesticides or fungicides, what is the price per kg . (or per unit) of this input in the village or in the local market, what is your purchasing price if the cooperatives buys the input wholesale and what is the selling price if you retail the input to your members?

	price per kg		
	in the village or in the local market	**wholesale purchasing by cooperative**	**selling / retailing to members**
fertilizer			
herbicides			
pesticides			
fungicides			
other material inputs			

18.How much of the various fertilizer, herbicides, pesticides or fungicides is used / required per rai or per tree, and per period?

	quantity	**unit (e.g. kg, lit.)**	**per tree / per rai**	**per year, month**
fertilizer				
herbicides				
pesticides				
fungicides				
other material inputs				

19.How is the fresh latex price (dry weight) determined that you pay to members?

by deducting costs per kg from current sales price of processed rubber	
by adding a small mark-up on the local price of fresh latex	
by using the nearby CRM price as reference	
other method of price determination (specify:)	

20.How are members paid for their fresh latex?*

direct payment in cash	
number of days delay in payment (average) after delivery	
payment in cash	
payment on a bank account	

* if methods of payment differ between members indicate share in % per method of payment

21.Bank accounts of members

how many members have an account at a commercial bank	
could you specify this number by bank	
BAAC	
OMSIN	
Krung Thai Bank	
other commercial bank (specify):	
how many members take credit from a commercial bank	

Your cooperative versus buyers of your processed rubber

22.Could you specify the major sales of processed rubber by buyer, type, quantity and price during the last year?

buyer	type of processed rubber*	quantity in kg	price per kg
intervention authority			
intervention authority			
intervention authority			
trader in Thailand			
(specify):			
(specify):			
processor in Thailand			
(specify):			
(specify):			
manufacturer in Thailand			
(specify):			
(specify):			
exporter in Thailand:			
Teck Bee Hang			
Thai Hua			
Von Bundit			
Southland			
Sri Trang			
Tavorn			
Chalong			
B Right			
other exporter specify:			

* 1: USS1; 2: USS2; 3: USS3; 4: RSS1; 5: RSS2; 6: RSS3; 7: yellow crepe; 8: other: (specify) ……

23.How is the price at which you sell your processed rubber determined?

by selling at the nearby intervention point	
by organizing a physical auction with traders, exporters and/or manufacturers	
by organizing a paper auction with traders, exporters and/or manufacturers	
by asking bids from with individual traders, exporters and/or manufacturers	
other method of price determination (specify:)	

Market based price insurance of natural rubber

The objective of this survey is to investigate a possible role for cooperatives in a new market based price insurance scheme. This alternative scheme should replace the current price intervention scheme, which is too costly. There are several ways in which this price insurance can be sold to the farmers[22]. To assess the alternative scheme one should imagine that the current price intervention scheme is abolished. Instead, prices of natural rubber (USS, RSS) may be insured at a private sector insurance company or at a bank. For example, a farmer who is expecting to produce 6,000 kg of natural rubber (dry weight) the coming 6 months can insure the price at which he sells. The farmer may decide to insure a price of 25 Baht per kg for a quantity of 5,000 kg (as he is not certain to produce 6,000 kg) at a premium of 0.5 Baht per kg. Hence the farmers receives a contract from the insurance company or bank paying 5,000 x 0.5 Baht = 2,500 Baht. During the period that is covered by the contract the farmer sells his production on the market. If the market price is below the insured price, the farmer receives the difference between the insured price and the market price from the insurance company or bank, on top of the price that is realised in the market. If the market price is equal or above the insured price the farmer receives nothing from the insurance company.

In case of a cooperative one can think of a comparable transaction. The cooperative may purchase insurance for the coming 6 months on the basis of expected production and cash the price difference from the insurance company if output is sold at a lower price than the insured price.

24.Are you interested to purchase market based price insurance for your processed output?

Would your cooperative purchase such an insurance if the insured price is the current intervention price (NB: assume the intervention scheme does not exist anymore) and if you have to pay a premium of:	
0.5 Baht premium per kg processed rubber (dry weight)	
1.0 Baht premium per kg processed rubber (dry weight)	
2.0 Baht premium per kg processed rubber (dry weight)	

[22] Packaging the price insurance with loans appears currently the most likely transmission mechanism.

25.Transferring premium costs to members?

How much of the payment of this premium in Baht will be on the account of the cooperative (less margin on processing activities) and how much on the account of the member (lower price for fresh latex):		
	on account of cooperative	on account of member
0.5 Baht premium per kg processed rubber (dry weight)		
1.0 Baht premium per kg processed rubber (dry weight)		
2.0 Baht premium per kg processed rubber (dry weight)		

26.Accounts at bank and credit

has the cooperative an account at a commercial bank	
at which bank	
BAAC	
OMSIN	
Krung Thai Bank	
other comercial bank (specify):	
does the cooperative take credit from a commercial bank	

27.Are you interested to sell market based price insurance to your members if you get a fee from the insurance company in return?

Do you think your members will purchase such a price insurance if the insured price is the current intervention price (NB: assume the intervention scheme does not exist anymore) and the members have to pay a premium of:	
0.5 Baht premium per kg processed rubber (dry weight)	
1.0 Baht premium per kg processed rubber (dry weight)	
2.0Baht premium per kg processed rubber (dry weight)	

We are grateful that you have filled in this questionnaire. The answers that you have given will be treated confidentially. We wish you lots of success with developing and expanding the activities of your cooperative!

Appendix C: List of Organizations and Companies Visited

Asian Development Bank, Bangkok
B Right Rubber Co Ltd, Hat Yai
Ban Wang Yai Rubber Co-operative, Surat Thanee
Ban Yang Nam Rubber Co-operative, Songkhla
Bangkok Bank, Bangkok
Bank for Agriculture & Agricultural Cooperatives, Bangkok
Bank of America, London, England
Bank of Thailand, Bangkok
Central Rubber Market, Hat Yai
Central Rubber Market, Surat Thanee
Cha Lung Rubber Co-operative, Songkhla
Chalong Latex Industry Co Ltd, Hat Yai
Chandee Rubber Co-operative, Nakorn Si Thammarat
Chevin Tavitiyaman (CTS), Hat Yai
Citibank, Bangkok
Coke Yang Rubber Co-operative, Nakorn Si Thammarat
ExIm Bank, Hat Yai
Federation of Thai Industries, Bangkok
Hong Kong and Shanghai Banking Corporation, Bangkok
International Financial Corporation, Bangkok
Krung Thai Bank, Bangkok
Ministry of Commerce, Department of Internal Trade, Bangkok
Nigoi Rubber Co-operative, Pattalung
Office of Agricultural Economics, Bangkok
Organisation of Rubber Replanting Aid Fund, Bangkok
Organisation of Rubber Replanting Aid Fund, Hat Yai
Rabobank, Bangkok
Rabobank, London, England
Rabobank, Singapore
Rubber Cooperatives Federation of Thailand
Rubber Estate Organisation, Pattalung
Rubber Holder Co-operatives Federation of Thailand, Hat Yai
Rubber Research Institute Thailand, Bangkok
Rubber Research Institute Thailand, Bangkok
Singapore Commodity Exchange, Singapore
Somchai Chaowkitivootti, Hat Yai
Southland Rubber Co Ltd, Hat Yai
Sri Trang Agro-Industry Public Company Ltd, Hat Yai
Standard Chartered Bank, Bangkok
Standard Chartered Bank, Singapore
Sup Thawee Rubber Co-operative, Surat Thanee

Targkuian Rubber Co-operative, Pattalung
Tavorn Rubber Industry (1982) Co Ltd, Hat Yai
Teck Bee Hang Co. Ltd, Hat Yai
Thai Hua Rubber Public Company, Bangkok
Thai Military Bank Public Company, Hat Yai
Thaimac unlimited, Bangkok
Thai Rak Thai, Bangkok
World Bank, Bangkok

Appendix D: Summary of BAAC Operations in Fiscal Year 1999[23]

In fiscal year 1999 (1 April 1999 - 31 March 2000), BAAC provided financial services to farmers and farmer institutions for their farm and farm-related activities as in previous years. The fifth revision of the BAAC Act, which became effective from 25th February 1999, permitted BAAC to expand its lending for non-farm activities that generate additional income for farm families. Clients may now borrow to finance industrial and commercial activities and services, including credit for the development of knowledge and improving their quality of life. The expansion of the scope of the lending program created opportunities for farmers to borrow for diversified activities that help them earn additional income.

BAAC also restructured its loan interest rates from the original computation method whereby interest rates depended on the loan amount, to a new method based on the Minimum Lending Rate (MLR) plus a Risk Premium. Originally, a client borrowing a large amount was charged a higher rate of interest than those who borrowed less, an approach termed 'cross subsidization.' The new loan interest structure is based on international conventions and strengthens the incentive for borrowers to keep a good debt repayment record. The new structure allows clients with overdue debts a chance to establish a new repayment record. The new method became effective on 1 August 1999. BAAC also reduced its loan interest rates during the year.

One effect of the economic crisis of 1997 was that urban workers who lost their jobs returned to their rural homes. This unexpected increase in the supply of labor enabled farmers to expand their agricultural output, thus requiring larger volumes of BAAC credit. High levels of liquidity in the banking system reduced interest rates for both loans and deposits compared with the previous year. BAAC reduced its rates on three occasions, which helped reduce their production costs. However, the farmers' increased production capacity combined with favorable weather resulted in increased production for most major crops. Moreover, worldwide agricultural output was relatively high while the demand for farm produce in world markets declined. This triggered fiercer competition among the trading countries, which resulted in lower prices of farm produce and a decline in farmers' debt-paying ability. To relieve these problems, BAAC applied certain measures to encourage farmers to pay their debts by the due date, resulting in slightly better debt repayments compared to the previous year.

[23] This appendix was supplied by BAAC.

The results of BAAC operations in FY 1999 were satisfactory and maybe summarized as follows:

1. Operating Areas, Number of Clients and Number of Branches

The main mission of BAAC is to provide financial services to farmers and farmer institutions throughout the country, as the Bank has always done. The number of new farmer clients rises each year while the operating areas are expanded to cover as much agricultural land as possible. In FY 1999 BAAC services reached farmers and farmer institutions in 877 districts and sub-districts in 76 provinces countrywide (excluding BAAC's Branch Offices in the Bangkok metropolis).

By the end of 1999 a total of 5 million farm families, or 88.54 percent of all farm families (according to the agricultural census of the National Statistical Office), had access to credit services from the Bank. Of this total, 3.50 million farm families were direct clients, 1.48 million were members of agricultural cooperatives and 0.02 million were members of farmer associations. The net rise of registered farmers during the year was 127,747 farm families, 2.26 percent above 1998.

In FY1999 BAAC adjusted its departmental structure to fit better with its implementation procedures, resulting in greater efficiency in providing services to farmers, farmer institutions and depositors. The Bank prepared itself for Y2K compliance both in the Head Office and throughout the Branch network resulting in a smooth transition during the critical period. By the end of FY 1999, 72 provincial branches functioned as supervisors of district branches. There were 587 BAAC branches providing financial services to farmers and farmer institutions, including services to depositors. The branches are classified as 432 district branches, 71 mini-branches that are similar in status to district branches and 84 sub-branches that are under the supervision of district branches. In addition there were 887 district field offices that serve as the operating base for the Bank’s field officers and as local points of contact for farmer clients.

2. Deposit Services

BAAC has improved and expanded its deposit services so as to compete for funds with other financial institutions. Deposits have become the main source of the Bank's operating capital, and the ratio of deposits to other sources of capital has risen each year. At present deposits account for 65 percent of the Bank's total operating fund. Deposits are more stable than loans as the basis of the Bank’s lending operations, especially loans from overseas that carry a serious exchange rate risk.

In 1999 there was as a high level of liquidity in Thailand’s banking system. This was because high levels of non-performing loans forced the banks to exercise tight control over their lending. As a result, credit volumes were lower than deposit volumes and weak competition for deposits reduced the deposit rate of interest. Nevertheless, the

financial institutions including BAAC did their best to retain their deposit customers for the sake of business operations in the future.

The Bank emphasized speedy, convenient and reliable service for depositors, and designed new deposit products suited to its clients' needs. During FY 1999 BAAC inaugurated the Islamic Banking Fund to provide financial services in compliance with Islamic religious principles, for Thai Muslim clients and the general public.

By the end of FY 1999, the total value of deposits was 180,563 million Baht, up 15,556 million Baht or 9.43 percent over the previous year. These deposits accounted for 65.26 percent of BAAC's operating fund.

3. Credit Services

In FY 1999 BAAC disbursed loans to farmers and farmer associations worth a total of 146,267 million Baht, up 18,829 million Baht or 14.77 percent over the previous year. The increase was due to favorable weather for cultivation, the start of economic recovery and the shift of labor from the industrial and service sectors back to the agricultural sector, resulting in increased demand for credit. Of the total disbursements, 124,097 million Baht (84.84%) was lent directly to farmer clients, 22,100 million Baht (15.11%) to agricultural cooperatives and 70 million Baht (0.05%) to farmer associations.

Loan disbursements classified by region, in million Baht, were as follows:

	Million Baht	%
North	43,170.70	29.51
Northeast	47,091.40	32.20
Center	11,396.50	7.79
East	14,110.10	9.65
South	18,010.40	12.31
West	12,488.30	8.54

Table 1-3 shows more details and the following sections provide further information on credit services.

4. Marketing Support for Farmers

In FY 1999 BAAC assisted farmers and farmer institutions with marketing. The Bank helped clients benefit from economies of scale by buying production inputs in large quantities through farmer institutions and provided a chance for farmers to learn about procurement and marketing procedures. The Bank launched its Central Agricultural Markets to help farmers market their produce and managed farm-produce pledging

schemes in accordance with government policy, for paddy, livestock-feed maize, cassava and coffee. Details of BAAC's marketing assistance activities are as follows.

4.1 Crop Pledging Schemes

In FY 1999 prices were low for a significant number of major crops, including rice, cassava, maize and coffee. The government requested BAAC to set up Crop Pledging Schemes to relieve the farmers' problems. Details of the schemes are as follows.

4.1.1 Paddy Pledging Scheme, 1999/2000

BAAC operated its Paddy Pledging Scheme for farmers and farmer institutions who had reliable and secure warehouses of their own. Redemption was required within five months from the month of pledging. The Bank disbursed 3,167 million Baht in loans for 632,464 tons of paddy pledged by 110,647 farmers and farmer institutions.

However at the end of the redemption period paddy prices in the market were generally lower than the pledged price. The government therefore extended the redemption deadline for another two months to allow farmers a chance to wait for prices to rise. At the end of the extension period prices in some areas were still lower than the pledged price. So the government directed BAAC to release 7,474 tons of paddy with a date-due redemption. The government paid 11 million Baht in compensation for losses from sales of the paddy to farmers and farmer institutions.

4.1.2 Livestock-Feed Maize Pledging Scheme, 1999/2000

BAAC, the Public Warehouse Organization and the Marketing Organization for Farmers jointly operated the Livestock-Feed Pledging Scheme. Farmers and farmer institutions with a suitable warehouse could pledge their livestock-feed maize directly to BAAC. Farmers with no storage of their own could deposit their maize with the PWO or MOF and receive a warehouse receipt that they could pledge to BAAC.

By the end of the pledging period BAAC had disbursed 13.93 million Baht in loans for 4,832 tons of maize pledged by 148 farmers and farmer institutions and disbursed 237.55 million Baht in loans for 61,998 tons of maze on the basis of 1,029 warehouse receipts.

4.1.3 Cassava Root Production Slowdown Scheme, 1999/2000

Unlike most crops, cassava does not have to be harvested immediately when it matures and farmers have some flexibility over when they will dig up the roots and sell them. Therefore BAAC launched a lending scheme to encourage farmers to delay digging their cassava roots in the 1999/2000 production year to prevent excess supply in the

market. The scheme operated in 48 provinces, covering 2.34 million rai of cassava, with a provision for loans valued at 3,276 million Baht.

In 1999 BAAC's actual lending under this scheme amounted to 469-3.9 million Baht in loans to 10,709 farmers cultivating 331,385 rai of cassava.

4.1.4 Cassava Flour and Pellet Pledging Scheme

BAAC operated this scheme in collaboration with the Public Warehouse Organization to help relieve problems arising from falling prices. Farmers employed factories to process their cassava roots into flour and pellets, deposited the flour and pellets with the PWO and received warehouse receipts that they pledged to BAAC. A similar approach could be used for other perishable farm produce such as pineapples and longans.

In 1999 BAAC disbursed 1.7 million Baht in loans for 434 tons of cassava flour and pellets, for 51 farmers and farmer institutions. The Bank disbursed 882.3 million Baht in loans for 401,936 tons of cassava flour and pellets pledged by 12,629 farmers and farmer institutions.

4.1.5 Coffee Pledging Scheme, 1999/2000

BAAC and the PWO jointly launched this scheme through the farmer institutions. The institution collected coffee beans from members, deposited them with the PWO and pledged the warehouse receipts with BAAC. After receiving loans from BAAC, the farmer institutions paid their members at prices specified by the government.

In 1999 BAAC disbursed 281.1 million Baht in loans for 8,706 tons of coffee seeds pledged by the farmer institutions.

4.2 Marketing Assistance on Trading in Farm Inputs and Produce

As a policy, BAAC encourages farmer clients to form groups for buying farm inputs and selling farm produce, in order to help them learn about marketing and trade, increase their bargaining power, reduce production costs and boost incomes. To achieve these objectives BAAC promoted and supported the operations of 75 Agricultural Marketing Cooperatives. The Thai Agri-business Company Ltd., (TABCO), a joint venture company owned by the AMCs. BAAC served as the coordinator and provided marketing information. The Bank joined with representatives of the Committee of the AMCs and TABCO to set up a Joint Committee for AMC Business Development and Sub-Committees to jointly examine the collective purchase of farm inputs and collective sale of farm produce.

In FY 1999 BAAC's support and assistance to the AMCs may be summarized as follows:
1) Procure goods and inputs by encouraging the AMCs to form collective groups for buying production inputs through TABCO under the following procedures:

- Organize a Special-Price Fertilizer Project by cooperating with the National Fertilizer Co., Ltd., to procure fertilizers for the AMCs at a special low price of 300-400 Baht per ton and to procure chemical fertilizers from other companies.
- Supply maize breeding seeds for the maize-producing AMCs at a below-market price of about 3 Baht per kilogram;
- Provide farm machinery for the AMCs at a below-market price of 300-500 Baht per machine.

2) Collect farm produce by encouraging the AMCs to collect outputs from their members for sale at fair prices. Coordinate with state and private copmanies to find more marketing opportunities for farmers as detailed below:

- Under the Coffee Collection Project, BAAC assisted its clients and five southern region cooperatives from Chumphon, Ranong, Surat Thani, Nakhon Si Thammarat and Krabi. Coffee export companies that joined the Project offered good security and deposited money with BAAC to pay for the coffee that the companies purchased from the AMCs.
- Advantages from the Project were that farmers gained experience concerning coffee quality and quality development and the AMCs gained experience on coffee collection.
- Under the Rubber Intervention Project, BAAC encouraged selected AMCs to buy rubber from their members at the official support price. The Nong Khai and Krabi provincial AMCs joined the Project.
- BAAC implemented the Fruit Export to China Project in coordination with the Beijing Academy of Agriculture & Forestry Sciences (BAAFS) which transported durians and mangosteens for sale in China. The Project aimed to encourage farmers to develop their output quality, thereby helping to raise the prices of their produce. The Rayong AMC joined the Project. Overseas markets were the main sales target.

In FY 1999 the overall marketing operations of the AMCs may be summarized as follows:
There were 74 AMCs countrywide with 2,901,617 members, 1,408.59 million Baht of share capital. They procured commodities for sale worth about 4,046.04 million Baht. Procurements included fertilizers worth 1,536.63 million Baht, machinery at 1,348.57 million Baht, breeding seeds at 461.68 million Baht, fuel oils t 147.34 million Baht, chemicals at 115.55 million Baht, livestock feed at 109.93 million Baht, consumer goods at 87.31 million Baht, breeding stock at 32.55 million Baht and other items at 10.63 million Baht.

The total value of loans for crop collection was 964.53 million Baht. Collected crops were paddy (333.18 million Baht), livestock-feed maize (306.33 million Baht), coffee (185.92 million Baht), rubber (48.88 million Baht), sugarcane (38.64 million Baht), cassava (10.95 million Baht), pineapple (10.47 million Baht), dried chili (8.69 million

Baht), cashew nuts (6.43 million Baht), mangosteen (4.14 million Baht) and others (10.63 million Baht.)

Service businesses earned 20.65 million Baht. Services included on-farm well digging, transportation and other service activities.

4.3 Implementation of Central Agricultural Markets

BAAC operated three central agricultural markets in the provinces of Suphan Buri, Khon Kaen and Roi Et. The markets were set up as meeting points for direct trading between buyers and sellers. BAAC provides these trading facilities to ensure convenience, speed and satisfaction to all parties. In 1999 BAAC administered two CAMs in Suphan Buri and Khon Kaen. The CAM in Roi Et was temporarily under the responsibility of the Roi Et AMC in order to allow the AMC to gain marketing experience and boost the potential for marketing business operations. As a result, Suphan Buri CAM bought 365,433.23 tons of paddy, worth 1,554.41 million Baht, from a total of 57,567 farmers. Khon Kaen CAM bought 85,033.34 tons of paddy, worth 406.48 million Baht, from 56,836 farmers. And Roi Et CAM bought 13,080.80 tons of paddy, worth 85.70 million Baht from 11,311 farmers. In total the three CAMs bought 463,547.37 tons of paddy, worth 2,046.59 million Baht from 125,714 farmers.

BAAC helped encourage AMCs to sell seasonal farm produce at the Wholesale Crop Market of Thailand, Thai Market and Si Mum Muang Market in Bangkok. The AMCs from the provinces of Rayong, Nakhon Si Thammarat, Nakhon Ratchasima, Suphanburi, Loei, Chachoengsao and Phathum Thani sold durians, mangosteen, dried chili, soft coconuts, sweet tamarind, jackfruit and fresh fish at the Markets. This is a new alternative marketing channel for the AMCs.

The BAAC Operating Fund

At the end of FY 1999 (31 March 2000) the BAAC operating fund totaled 276,680 million Baht, up 11,390 million Baht or 4.29 percent over the previous year. During the past five years (FYs 1995 - 1999) the average annual growth of the operating fund was 14.11 percent. The main sources of the operating fund have been deposits and borrowings from local and overseas financial institutions. Further details of the operating fund are presented in Tables.

Movements of the BAAC operating fund in FY 1999, classified by source, may be summarized as follows:

1. Shareholders' Equity

At the end of FY 1999 shareholders' equity amounted to 20,555 million Baht, up 2,843 million Baht or 16.05 percent over the previous year. This accounted for 7.43 percent of the total operating fund, up from 6.68 percent. Movements to boost shareholders'

equity included 84 million Baht paid from dividends to the Ministry of Finance; 1,500 million Baht as share capital from the Ministry of Finance; 13 million Baht as share capital from agricultural cooperatives and private individuals (including BAAC personnel); 6 million Baht in surpluses from donations; a 42 million Baht increase in reserves; 162 million Baht from non-appropriated retained earnings; 1,036 million Baht from the decline of deferred losses on exchange rate fluctuations in the previous year. During the year under review the increase in capital from the Ministry of Finance, including 1,000 million Baht from the Credit Acceleration for Poor and Small-Scale Farmer Project, 1989 - 1993, and 9,000 million Baht from structural adjustment loans, were transferred to the share capital account. Further details of shareholders' equity are presented in Tables.

2. Deposits from the Public

At the end of FY 1999 BAAC's deposits from the public (excluding deposits from commercial banks) totaled 180,563 million Baht, up 15,556 million Baht or 9.43 percent over the previous year. This was 65.26 percent of the total operating fund, up from 62.20 percent 1998.

3. Borrowing

At the end of FY 1999 borrowings from local and overseas sources amounted to 41,783 million Baht, classified as 3,120 million Baht from local and 38,663 million Baht from overseas borrowings, (including loan adjustments for exchange rate variations on overseas borrowing). This was an increase of 126 million Baht or 0.30 percent over the year before. Borrowing accounted for 15.10 percent of the total operating fund, down from 15.70 percent in 1998.

During the year under review BAAC repaid 550 million Baht for matured loans to the sources of funds. Loan adjustments for exchange rate variations on overseas borrowing increased the amount of principal outstanding by 676 million Baht.

4. Borrowing from the Bank of Thailand

At the end of FY 1999 borrowing from the BOT amounted to 1,000 million Baht, equal to the previous year. This amount was 0.36 of the total operating fund, down from 0.38 percent the previous year.

5. BAAC Bonds

At the end of FY 1999 the value of bonds issued by BAAC amounted to 17,500 million Baht, down 7,000 million Baht or 28.57 percent from the year before. This amount was 6.33 percent of the overall operating fund, down from 9.23 percent recorded last year. The fall was due to payments for matured bonds.

6. Other Liabilities

At the end of 1999 BAAC's other liabilities amounted to 15,279 million Baht, down 90 million Baht or 0.59 percent from the preceding year. This amount was 5.52 percent of the total operating fund, down 5.79 percent from the year before. Further details on other liabilities are classified as follows:

(1) Government project creditors	10,369 million Baht
(2) Retirement fund	272 million Baht
(3) Accrued interest payable	1,411 million Baht
(4) Other creditors	3,227 million Baht

Revenues, Expenses and Net Profit

Despite the economic recovery, the high level of non-performing loans (NPLs) required BAAC to increase its provision for doubtful debts. In addition BAAC reduced its interest rate by 1.50 percent, effective from 1 December 1999, reducing loan interest income. Nevertheless, BAAC continued to take steps to reduce its operating costs, resulting in a rise in operating profit compared to 1998. The main points concerning revenues, expenses and profits may be summarized as follows:

1. Revenues

In FY 1999 BAAC’s income amounted to 24,011 million Baht, down 3,158 million Baht or 11.62 percent from the preceding year. Most of this income was from interest earned on loans, amounting to 21,265 million Baht or 88.56 percent of total income, down 1,645 million Baht or 7.18 percent. Other income sources included interest earned on deposits with other banks, interest earned on government bonds, bills of financial institutions and income earned on discount bills. This other income totaled 2,746 million Baht or 11.44 percent of the Bank's total income, down 1,513 million Baht or 35.52 percent from the year before.

2. Expenses

In FY 1999 BAAC's expenses amounted to 23,731 million Baht, down 3,236 million Baht or 12.00 percent from previous year. Total expenses may be classified into two main categories: costs of funds and operating expenses.

The costs of funds amounted to 12,056 million Baht or 50.80 percent of total expenses, down 4,138 million Baht or 25.55 percent from the year before. Other operating expenses, including a bonus paid to the Bank's staff and Board directors, amounted to 11,675 million Baht or 49.20 percent of total expenses, up 903 million Baht or 8.38 percent over 1998.

3. Net Profit

In FY 1999 BAAC's net profit amounted to 280 million Baht, up 77 million Baht or 37.93 percent over the previous year. The 280 million Baht net profit amounted to 1.36 percent of shareholders' equity or 0.10 percent of the Bank's total operating fund. This net profit amounted to 0.13 percent of the average value of loans outstanding, up by 0.11 percent compared with the previous year. Table shows further details.

Bank for Agriculture and Agricultural Cooperatives
Profit and Loss Statement
For the years ended 31 March 2000 and 1999

	31 March 2000 Baht	31 March 1999 Baht
Revenues		
Interest earned on loans to client farmers	19,767,731,613	21,187,175,978
Interest earned on loans to farmer institutions	1,496,717,348	1,723,347,629
Interest earned on deposits with other banks	32,042,363	143,200,763
Interest earned on government bonds and		
- bills of financial institutions	541,567,286	2,265,522,762
Income earned on purchase of discount bills	562,914,997	126,568,339
Interest earned on deposits-secured loans	45,987,875	60,285,616
Income from recompense-costs of fund	339,072,678	423,335,742
Other income (Note 3.17) 1,225,042,005	1,240,140,693	
Total revenues	24,011,076,165	27,169,577,522
Expenses		
Salaries, wages, and fringe benefits	3,290,924,595	3,122,751,697
Bonus paid to directors and employees (Note 2)	803,548,293	786,213,334
Interest paid on deposits	6,054,933,757	10,034,904,914
Interest paid on commercial-bank deposits	-	261,097,641
Interest paid on borrowing and promissory notes	3,987,110,078	5,320,549,969
Loans-related expenses (Note 3.18) 31,405,650	27,020,291	
Travel and per diem expenses	126,324,614	119,523,186
Provision for doubtful accounts (Note 3.19)	5,664,933,820	4,833,159,375
Bad debts written off	6,629,870	8,955,232
Other expense	1,179,330,312	1,286,580,192
Depreciation on assets and leasehold amortization	592,319,999	616,413,909
Losses due to exchange rate fluctuations	1,982,895,415	549,600,454
Losses due to stock devaluation	10,240,000	-
Total expenses	23,730,596,403	26,966,770,194
Net profit	280,479,762	202,807,328
Net profit per share (Note 1.2.11)	1.90	2.02

Notes to Financial Statements are an integral part of these statements

Bank for Agriculture and Agricultural Cooperatives
Statement of Retained Earnings and Profit Appropriation
For the years ended 31 March 2000 and 1999

	31 March 2000 Baht	31 March 1999 Baht
Retained earning brought forward	3,460,770,113	3,640,909,279
Adjustment, increase (decrease)		
Bonus appropriation for directors and employees,		
- as of 31 March 1998	-	(898,967,167)
Bonus appropriation for directors and employees,		
- as of 31 March 1999	(786,213,334)	-
Income from Pension Fund and Housing Fund,		
- as of 31 March 1999	62,711,535	-
After-adjustment retained earning brought forward	2,737,268,314	2,741,942,112
Less : Appropriation of net profit of previous year:		
Dividends	83,791,080	140,722,647
Reserves	41,896,000	71,000,000
	2,611,581,234	2,530,219,465
Plus : Bonus unpaid	7,440,649	4,241,426
Dividends unpaid	-	95
Net profit of the year	280,479,762	202,807,328
Retained earning unappropriated	2,899,501,645	2,737,268,314

Notes to Financial Statements are an integral part of these statements

Bank for Agriculture and Agricultural Cooperatives
Cash Flow Statement
For the years ended 31 March, 2000 and 1999

	31 March, 2000 Baht	31 March, 1999 Baht
Cash flow from operational activities		
Net profit	280,479, 762	202,807,328
Adjustment against net profit balance to - compute cash received (paid) from operational activities		
Depreciation of assets and leasehold amortization	592,319,999	616,413,909
Provision for doubtful accounts	5,664,933,820	4,833,159,375
Losses due to exchange rate fluctuations	1,982,895,415	549,600,454
Losses due to stock devaluation	10,240,000	-
	8,530,868,996	6,201,981,066
Loans	(24,817,697,776)	(22,013,373,775)
Accrued interest receivable	(1,000,472,112)	(3,691,025,597)
Properties foreclosed	(24,878,309)	(10,658,696)
Other assets	933,038,082	4,170,250,705
Deposits	15,556,220,224	33,165,966,806
Interest-bearing inter-bank accounts	(44,800,000)	(3,566,317,500)
Other liabilities	(89,969,271)	1,714,597,751
Net cash received from operational activities	(957,690,166)	15,971,420,760
Cash flow from investment activities		
Investment in fixed assets	(332,034,495)	(438,901,591)
Investment in securities	1,720,000,000	(6,868,500,000)
Net cash paid for investment activities	1,387,965,505	(7,307,401,591)
Cash flow from fund procurement activities		
Increase in capital	1,596,048,200	10,790,634,200
Borrowing	(7,820,246,493)	(11,957,426,477)
Surplus from donations	6,224,621	14,371,151
Dividends paid	(83,791,080)	(140,722,552)
Bonus paid for directors and employees	7,440,649	(894,725,741)
Net cash paid for fund procurement activities	(2,187,869,419)	(6,294,324,103)
Net increase (decrease) of cash and cash equivalent items	(5,864,048,764)	6,476,149,750
Cash and cash equivalent items brought forward	3,414,151,968	9,890,301,718
Cash and cash equivalent items as at the years ended	4,026,252,954	9,890,301,718

Notes to Financial Statements are an integral part of these statements